DECEMBER, 1956

modern castings

Owned by

THE MEN WHO BUY

Foundry Layout
12-page special bonus section tells how foundrymen can save time and labor by improving the layout of their plants

Holly and Sand . . .
Christmas story about a foundry supplier's hobby—growing holly

45-Minute Slag Analysis
One chemist can analyze oxides of Si, Ca, Mg and Fe by fast method

Castings for Kids
Chicago's Dowst Mfg. Co. turns out die-cast toys by the million

Choke that Gate
Here's a system that gives good results with copper base alloys

5000 Sq Ft Foundry
Induction melting solves serious space problem at Youngstown plant

Casting White Iron Balls
Water cooled permanent molds help Homestake Mine make grinding balls

Cover Photo
This is a solar furnace. High atop a building at Caltech, it is used to explore a new frontier in metallurgical knowledge. "Melting Metal With Sun-Power."

future meetings and exhibits

DECEMBER

5-7 . . American Institute of Mining and Metallurgical Engineers, *Morrison Hotel, Chicago. Electric Furnace Steel Conference.*

10-11 . . Material Handling Institute, Inc., *Biltmore Hotel, New York. Annual Meeting.*

1957

JANUARY

18 . . Malleable Founders' Society, *Hotel Cleveland, Cleveland. Semi-Annual Meeting.*

FEBRUARY

4-8 . . American Society for Testing Materials, *Benjamin Franklin Hotel, Spring Meeting.*

7-8 . . Malleable Founders' Society, *Wade Park Manor, Cleveland. Second Technical and Operating Conference.*

14-15 . . Wisconsin Regional Conference, *Hotel Schroeder, Milwaukee. Sponsored by the Wisconsin Chapter and the University of Wisconsin Student Chapter of the American Foundrymen's Society.*

21-22 . . Southeastern Regional Foundry Conference, *Dinkler-Tutwiler Hotel, Birmingham, Ala. Sponsored by the Birmingham and Tennessee Chapters and the University of Alabama Student Chapter of the American Foundrymen's Society.*

MARCH

11-15 . . Nuclear Congress, *Convention Hall, Philadelphia.*

13-14 . . Foundry Educational Foundation, *Hotel Cleveland, Cleveland. College-Industry Conference.*

15-16 . . California Regional Foundry Conference, *Claremont Hotel, Berkeley, Calif. Sponsored by the Northern California and Southern California Chapters of the American Foundrymen's Society.*

18-19 . . Steel Founders' Society of America, *Drake Hotel, Chicago. Annual Meeting.*

25-29 . . American Society for Metals, *Pan-Pacific Auditorium, Los Angeles. Tenth Western Metal Exposition and Congress.*

APRIL

10-11 . . **Malleable Founders' Society,** *Edgewater Beach Hotel, Chicago. Market Development Conference.*

12-13 . . **East Coast Regional Foundry Conference,** *Benjamin Franklin Hotel, Philadelphia. Sponsored by the Philadelphia, Metropolitan and Chesapeake Chapters of the American Foundrymen's Society.*

MAY

6-10 . . American Foundrymen's Society, *Cincinnati. Castings Congress.*

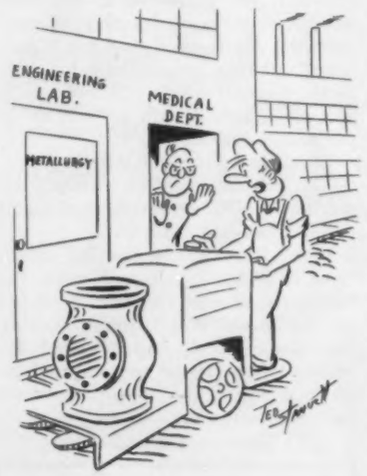
JUNE

13-14 . . Malleable Founders' Society, *The Broadmoor, Colorado Springs, Colo. Annual Meeting.*

16-21 . . American Society for Testing Materials, *Chalfonte-Haddon Hall, Atlantic City, N. J. Annual Meeting.*

20-22 . . Penn State Regional Foundry Conference, *Penn State University, State University, Pa. Sponsored by the Rochester, Pittsburgh, Metropolitan, Eastern New York, Western New York, Northwestern Pennsylvania, Central New York, Chesapeake and Philadelphia Chapters and the Penn State University Student Chapter of the American Foundrymen's Society and the Reading Foundrymen's Assn. and Conestoga Foundrymen's Assn.*

23-25 . . Alloy Casting Institute. *The Homestead, Hot Springs, Va. Annual Meeting.*



Doc, I have a body here to be x-rayed!

CIRCLE NO. 122, PAGE 7-8

Announce High-Heat Alloy

Development of a high-temperature alloy for investment casting has been announced by Haynes Stellite Co., Div., Union Carbide & Carbon Corp. The alloy, GMR-235, was developed with the research laboratories division of General Motors.

This alloy is a nickel-base, high-temperature alloy containing chromium, molybdenum, iron and boron with aluminum and titanium as precipitation-hardening agents. It is produced by two methods, either air-melting or vacuum-melting and was designed for investment-cast turbine wheels, buckets, and vanes for use at temperatures in excess of 1400 F.

It has a higher yield strength than any other production alloy with comparable strength above 1400 F. The alloy also has good room-temperature ductility, a very low strategic alloy content, and is said to exhibit a remarkable resistance to overaging at service temperatures for periods of 1000 hours.

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Amateur inventors who have solved many technical problems for the armed services in the past may have the answers to pressing current problems.

In an effort to channel the ideas of inventors, amateur and professional, the National Inventors Council was formed in 1940 as an activity of the U. S. Department of Commerce. The Council publishes a cumulative list of technical problems turned over to it by the military agencies. An inventor who has a proposed solution may submit his idea to the Council which will evaluate it and, if practical, will present it to the proper authority.

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Answer questions by sending for data describing the newest products and processes. Order now by using the cards on **page 7-8.**

BONUS SECTION

december, 1956
vol. 30, no. 6

modern castings

in this issue

BONUS SECTION

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AUDITED PAID CIRCULATION ABC

On The Management Side

■ **How's business?** You get all kinds of answers from all kinds of people. Total employment in foundries declined for seven consecutive months through July. Yet it was still above the levels of a year ago in iron and steel foundries though below last year in non-ferrous foundries.

One gets a different picture from looking at the primary metal industries (which include foundries) as a whole. Output rose throughout 1955 and leveled out at near-capacity rates in the first half of the year. Although the figures for more recent months have been distorted by work stoppages in steel, copper and aluminum, September production was at record rates. In August, unfilled orders were higher than a year ago, more than twice the volume of two years ago.

■ **Export license** bills governing iron and steel scrap exporters have been further simplified by the U.S. Bureau of Foreign Commerce. This Federal action makes export of scrap much easier despite efforts of metals industry groups to persuade the Government to reduce scrap exports. Scrap exports have risen to the point where the total for 1954 and 1955 is believed to equal about half the total tonnage shipped in the previous 54 years, according to National Foundry Association.

■ **Col. Willard F. Rockwell**, board chairman of the Rockwell Manufacturing Co., told the Pittsburgh Chapter of AFS a few weeks ago that politically motivated metals stockpiling in recent months has forced thousands of small businesses to the brink of bankruptcy. Colonel Rockwell blasted "bureaucrats" of both major political parties. Among his comments were:

- Government manipulation causes "tidal wave" price fluctuations and terrific inventory and other losses.
- These losses are mostly to small businesses because big business has been able to protect itself through many wide price swings by long term contracts.
- In the summer, Government stockpiling created such a shortage of aluminum scrap that secondary aluminum could only be purchased by small foundries at 8 cents above the primary aluminum price.

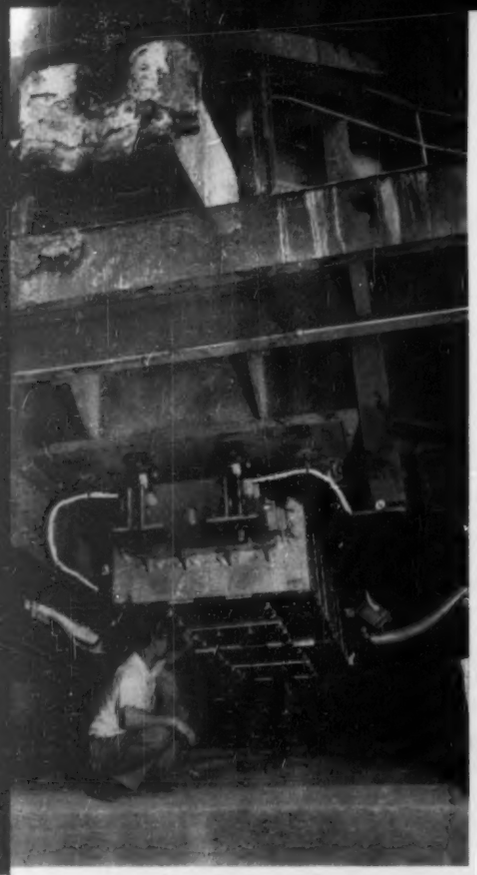
"But when the Government announced that its aluminum stockpile was complete, the secondary price dropped to its historic position, which is lower than the primary price. Literally thousands of small businessmen had to absorb terrific inventory losses."

- The nickel stockpiling program is "wicked" and has promoted a gray market with prices 200% higher than normal price. Defense contractors have been encouraged to overestimate their nickel requirements and indulge in "defense profiteering."

(Incidentally, the Government has diverted about 25 million lb of nickel from its stockpile to private industry in this quarter and ODM said it will issue no calls to stockpile nickel during the first quarter of 1957.)

■ **Producers** of primary metals, of course, are in favor of stockpiling. The Tungsten Institute meeting in Los Angeles in October heard pleas for domestic price supports for tungsten or that the U.S. buy all domestic production.

modern castings album

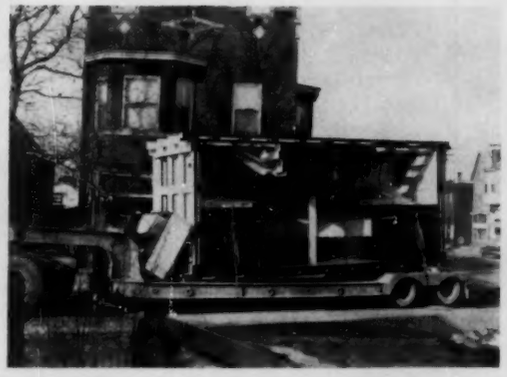


Better alloyed castings will come from steel melted in electric arc furnaces that use electric currents to stir the molten metal. Such an "induction stirrer mechanism" has been installed at the steel foundry of General Electric's Foundry Dept. in Schenectady, N. Y. Installation of stirring equipment for this 50,000 lb capacity furnace cost $200,000. A special 250 KVA generator (below) will supply the current to the mechanism. GE has plans for a second installation of the stirrer in the Schenectady steel foundry.

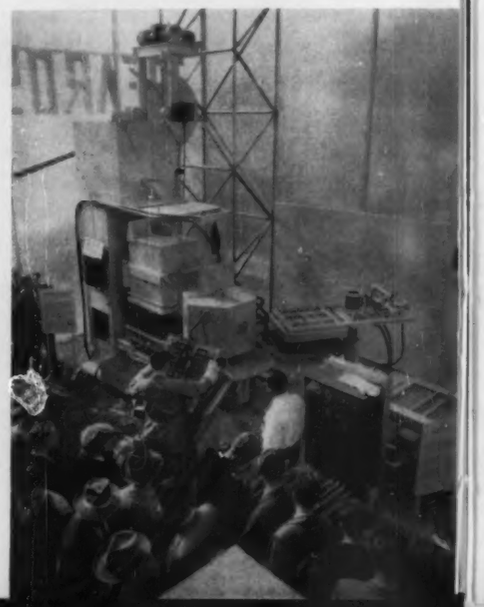
Two died and 20 were injured when the administration building of Ampco Metals, Inc., Milwaukee, was blasted apart by the explosion of a boiler in the heating system. More than 100 are employed in the office, but many were out of the building at the time of the blast. Total property damage was estimated at about $200,000. See *foundry trade news* for additional news of Ampco's activities. *UP Photo.*

Aerial foundrymen are the boys at Empire Steel Castings, Inc., Reading, Pa. Only foundry in the East with its own plane, Empire has replaced its first aircraft with this new twin-engine Aero Commander. The plane is used to fly Empire's customers to the plant and to deliver rush orders. Here, pilot Bill Firstin checks on the loading of a 398 lb stainless steel casting.

Chicago foundrymen have wanted the industry to know that they can make the big ones, too. Chicago Heights Pattern and Model Works put 5000 board ft of lumber into this pattern and another 6000 ft into the core box. The Continental Foundry and Machine division of Blaw-Knox cast a steam turbine housing with this massive equipment.



U.S.-built foundry equipment on display in Dusseldorf at the International Foundry Trade Fair won the interest of many visitors. Three U.S. firms exhibited: Beardsley & Piper, Shalco Eng. Corp., and Eastern Clay Products. Shown here is the Beardsley & Piper exhibit. This display was in a separate pavilion located alongside the main convention halls. Equipment for both green sand and shell molding was on display in the exhibit.



Foundrymen in Utah Vote to Form AFS Chapter

■ Utah foundrymen meeting in Salt Lake City voted unaminously October 31 to petition the American Foundrymen's Society board of directors for formation of a Utah Chapter of the society, the 46th of the AFS organization and the fourth to be organized during the past 12 months. The new group plans to meet alternately at Salt Lake City and Provo and has petitioned to include Utah, Arizona and southern Idaho in its territory.

A. S. Klopf, American Gilsonite Co., headed the steering committee. He is a past chairman of the Chicago and Wisconsin chapters.

AFS representatives present included C. C. Drake, Griffin Wheel Co., Denver, national director, who described the opportunities and advantages of local foundry meetings, AFS General Manager Wm. W. Maloney, and field membership director D. M. Hayes who outlined the society operations.

Members of the steering committee in addition to Chairman Klopf included: Everett H. Bachman, Bachman Foundry Co.; Byron R. McKay, Star Brass Foundry & Refining Co.; J. W. Nielson, U.S. Steel Corp.; J. F. May, Lundin & May Foundry Co.; C. C. Cardall, Pacific States Cast Iron Pipe Co.; and J. N. Carter, American Foundry & Machine Co.

Officers and directors elected by the group are: Chairman, A. S. Klopf; 1st vice-chairman, C. C. Cardall; 2nd vice-chairman, D. N. Rosenblatt, American Foundry & Machine Co.; secretary, E. N. Rowe, American Gilsonite Co.; treasurer, Fred Hafen, Pacific States Cast Iron Pipe Co.

Directors nominated: (3 years) J. N. Carter, W. W. Brown, Pacific States Cast Iron Pipe Co.; (2 years) J. W. Nielson, and Byron R. McKay; (1 year) E. H. Bachman, and J. F. May. All officers and directors will serve for the balance of the current fiscal year. Official installation for the new chapter is scheduled for January 21.

Low Temperature Data

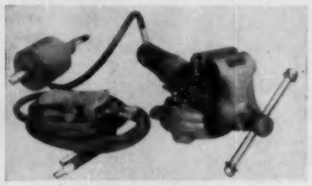
Low-temperature properties of metals, compiled in 1952, has been published by the Army Corps of Engineers. *"Conference on Materials and Design for Low Temperature Service"* though based on information four years old, is said to be one of the few comprehensive collection of material on the subject. Obtainable from OTS, U. S. Dept. of Commerce, Washington 25, 400 pages, price $10.

products and processes

Blast cleaning unit is operated on air line using a variety of abrasives. Total weight is 10 lb. Design provides a housing around area being blasted; within the housing a suction recovers the abrasive used and the contaminated material and dust. *Clementina Ltd.*

CIRCLE NO. 1, PAGE 7-8

Automatic bench vise can open and close up to 2000 times per hour. Locking force varies directly as air



input pressure so that soft pieces can be handled. The main nut and screw of vise is engaged at all times and may be preset to desired opening. *Wilton Tool Mfg. Co., Inc.*

CIRCLE NO. 2, PAGE 7-8

Industrial 35 mm camera has integrated camera and flashholder with 3 and 4 in. reflectors. It has f 3.5

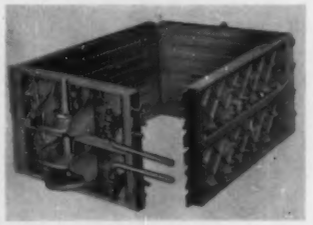
lens and built in range finder and 8 speed shutter range. *Eastman Kodak Co.*

CIRCLE NO. 3, PAGE 7-8

Electric fork truck, 6000 lb, features low silhouette and needs only 6 ft of clearance for operation. Designed for loading closed trucks and trailers. Steering and controls are automotive type. *Baker-Rauland Co.*

CIRCLE NO. 4, PAGE 7-8

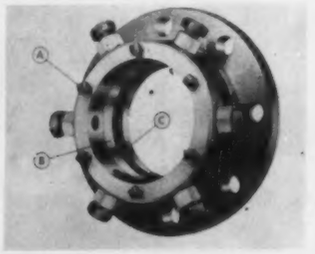
Flasks, straight-wall, Hinge-Off, are recommended for hand and mechanical molding of loose, match plate, and cope and drag plate patterns up to 20 in. in length. Provided with a positive, fast-acting, locking mechanism that aligns and locks open end



rigidly to prevent shift when squeezing. *The Hines Flask Co.*

CIRCLE NO. 5, PAGE 7-8

Pipe flanges may be either bolted in place or welded. They slip over pipe ends, seal off and mate up with standard flange facings. When end thrust screws (A) are tightened the steel thrust ring (B) moves forward



and squeezes the packing ring (C) out between the pipe walls. Available 2 to 12 in. size with standard steel flanges. *The Pipe Line Development Co.*

CIRCLE NO. 6, PAGE 7-8

Aluminum paint capable of withstanding temperatures to 1700 F is

composed of a clear silicone base with a special flake pigment. It air dries in 30 min. and may be applied by brush or spray gun. *Chem Industrial Co.*

CIRCLE NO. 7, PAGE 7-8

Spray penetrating oil in aerosol container offers convenience in can and has ability to reach the inaccessible spots. One can covers about 25 sq ft. *Rothlan Corp.*

CIRCLE NO. 8, PAGE 7-8

Non-destructive testing dye, Zip, is sprayed from pressurized bomb, preferably on a warm surface. Surface defects are outlined in about 90 sec; they develop slightly and then remain constant for hours. Dye may be removed with water. *Saco Laboratories Div., Zip Abrasive Co.*

CIRCLE NO. 9, PAGE 7-8

Vacuum melting furnace for laboratories has maximum operating temperature of 3600 F, melts up to 12 lb of steel. This self-contained unit performs resistance melting, induction melting, annealing, degassing, heat treating, brazing and sintering. *High Vacuum Equipment Corp.*

CIRCLE NO. 10, PAGE 7-8

Steel basket designed for moving castings between heat treat and quench has four lifting hooks for use with crane and a front door for unloading. Basket measures 84 x 60 x 51 in., weighs 2000 lb and handles a work load of 10,000 lb. *Wiretex Mfg. Co., Inc.*

CIRCLE NO. 11, PAGE 7-8

Fire-resistant hydraulic fluids are designed where petroleum fluids present a fire hazard. They are said to have outstanding corrosion and wear resistance. *Carbide and Chemicals Co., Div., Union Carbide & Carbon Corp.*

CIRCLE NO. 12, PAGE 7-8

Electroforming device is said to produce highly precise intricate plastic mold cavities without porosity or surface defects. Reproduces shapes which can't be machined or hobbed. *Powerad Co., Inc.*

CIRCLE NO. 13, PAGE 7-8

Epoxy hardener for use with plastic laminates is used at room temperature. It is said to give excellent toughness and flexibility. Uncured resin has long pot life. *Smooth-On Mfg. Co.*

CIRCLE NO. 14, PAGE 7-8

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Please use card before June 1, 1957

Thermocouple and indicating meter have been combined to indicate surface temperatures with a one-second contact. The dial is calibrated in C & F scales. No batteries or external connections are needed for operating. *Royco Instruments.*

CIRCLE NO. 15, PAGE 7-8

Cloth-filter-type dust collectors are designed for super cleaning ordinary atmospheric air. It is said to have wide usage such as filtering air to compressor intakes and other installations where dust-free air is required. *Wheelabrator Corp.*

CIRCLE NO. 16, PAGE 7-8

Modified constant voltage welders permit a fuller control over a wide range of applications. The line consists of 300, 500, 750 and 1200 amp machines. Main feature is an adjustable slope control that gives a softer arc, eliminates burnback and stubbing and provides a stable, spray-type deposit for aluminum, stainless steel and other alloys. Advantages of are said to be simplified operation, lower installation and power costs and X-ray welds for inert gas, submerged arc, semi-automatic and all metallic-arc automatic welding processes. *Harnischfeger Corp.*

CIRCLE NO. 17, PAGE 7-8

Grinder has built in dust collecting unit with removeable drawer and 4 in. exhaust outlets. Machine available in 12 or 14 in. size with adjustable work rests and spark breakers. *The Standard Electrical Tool Co.*

CIRCLE NO. 18, PAGE 7-8

Exterior wall curtain is suitable for construction of one, two and three story structures. Interlocking split-mullion design provides for horizontal expansion and contraction. Components include insulated panels, operable sash, fixed sash and doors which are factory-assembled and shipped to site complete with all parts. *Kawneer Co.*

CIRCLE NO. 19, PAGE 7-8

Cutting torch is said to be the largest capacity handcutting blowpipe. It will cut risers over 55 in. thick. The torch has separate lines for preheating and cutting oxygen and is designed for use with medium-pressure acetylene but other fuels may be used. *Linde Air Products Div., Union Carbide & Carbon Corp.*

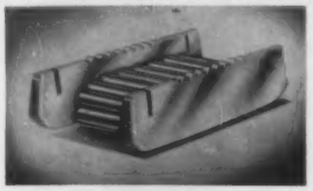
CIRCLE NO. 20, PAGE 7-8

Floor preparation etches and cleans in one operation. Sure-Etch starts bubbling action in 30 sec., opening floor pores. After rinsing and drying

it may be painted. Gallon covers 200-250 sq ft. *Colonial Refining & Chemical Co.*

CIRCLE NO. 21, PAGE 7-8

Heavy machine rollers in five sizes can carry from 2 to 150 tons. The unit consists of a series of moving



rollers locked in an endless track extending above and below a heavy steel frame. Frame has serrated edges which grip and carry the load. *Express Roller Div., Industrial East Co.*

CIRCLE NO. 22, PAGE 7-8

pH meter, pocket-sized, is battery operated and has range from 2 to 12 pH. Flash light batteries are em-

ployed. A single electrode combines both the reference and glass electrodes. *Scientific Div., Beckman Instruments, Inc.*

CIRCLE NO. 23, PAGE 7-8

Salamanders which operate on natural or LP gas are equipped with safety shutoff and thermostatic control which returns to pilot operation after reaching temperature. May be

used for construction work heating. Control dial may be located 54 in. from heater. *Insto-Gas Corporation.*

CIRCLE NO. 24, PAGE 7-8

Magnetic grip on safety plexiglas shield allows placing it in difficult positions. The shields come in a va-

riety of sizes and with one or three magnets in base. *Dilley Mfg. Co.*
CIRCLE NO. 25, PAGE 7-8

Hollow shell core blower, 200 Series, is fully automatic and features a swinging head. An exclusive sand feed arrangement delivers sand from main bin to self-feeder hopper and

transfers sand to the tube between blowing cycles. One side of unit is curing while other is blowing cores. *Harrison Machine Co.*
CIRCLE NO. 26, PAGE 7-8

Rust preventative may be mixed with water, oil or solvent or used neat. When mixed with water it produces a non-volatile solution, a safety factor. *E. F. Houghton & Co.*
CIRCLE NO. 27, PAGE 7-8

Drum handler designed for 1000 lb. loads has locking action which clamps

chime of 30 and 55 gal drums. Load is lifted with hydraulic pump and ram. Available with hand-operated one-way 10 gpm pump. *Coolant Equipment Co.*
CIRCLE NO. 28, PAGE 7-8

Self-contained sprayer incorporates a pressured propellant with a separate bottle containing the material to be used. Spray nozzle is adjustable. Propellant is non-toxic and non-

CIRCLE NO. 127, PAGE 7-8

toxic and non-flamable. *Met-L-Chek Western.*

CIRCLE NO. 29, PAGE 7-8

Space heater which is portable produces 70,000 to 140,000 BTUs per hr using ½ to 1 gal of fuel oil. They require no ventilation in rec-

ommended use and may be used as portable space heaters or for permanent, supplementary or spot heating use. A 10 gal filling last 20 hr at normal burning rate or 10 hr at full capacity. *Scheu Products Co.*

CIRCLE NO. 30, PAGE 7-8

Plastic-steel product becomes a steel like mass after hardening two hours. A combination of 80 per cent steel and 20 per cent plastic the material can be worked with regular metal tools. It comes in either a putty or

viscous type. A special hardener is added to the plastic, stir and press or pour into shape. There is said to be practically no shrinkage. *Devcon Corp.*

CIRCLE NO. 31, PAGE 7-8

Stacking baskets made of flat expanded metal on welded steel wire frames have an open mesh construction for quick drainage and easy

cleaning. Patented interlock handles give convenient stacking and compact 12 x 20 x 5½ in. *Wire & Iron Products, Inc.*

CIRCLE NO. 32, PAGE 7-8

Wet blast unit is designed to eliminate wire brushing of cast iron and aluminum pistons weighing in range of 42 lb. The pistons are manually loaded on spindles with the entire outside diameter blasted with oscillating guns. Next they are rinsed and finally rust preventative is applied. Unloading is manual. *The Cro-Plate Co., Inc.*

CIRCLE NO. 33, PAGE 7-8

Epoxy resins now have safety hardeners which are non-dermatitic and resistant to high humidities. Line includes steel filled, aluminum filled and mineral filled pastes which cure completely at room temperature with the addition of a hardener. *Furane Plastics, Inc.*

CIRCLE NO. 34, PAGE 7-8

Abrasive cut-off machine, the Radiac, may be mounted on a hand or powered truck. It is designed for dry cutting and uses a rubber bonded abrasive or a resinoid bonded disc. It is suitable for cutting steel tubing or cast iron pipe up to 4 in. o.d. and most solid metals up to 2-5/8 in. o.d. *A. P. De Sanno & Son, Inc.*

CIRCLE NO. 35, PAGE 7-8

Grinding wheels, reinforced with fabric, bonded with resins and made with a depressed center are recommended in foundries for cutting off gates and risers and removing surface defects. One wheel is recommended for steel and steel alloys, another for gray iron, non-ferrous metals and non-metallics. *American Emery Wheel Works.*

CIRCLE NO. 36, PAGE 7-8

Boom on low cost truck with a load capacity of 1500 lb at maximum extension of 42 in. and 2500 lb at minimum length of 12 in. allows precision handling of castings, dies and heavy machine tool attachments. Controls allow boom to be positioned within 1/100 in. *Vanguard Engineering.*

CIRCLE NO. 37, PAGE 7-8

Gas burners, RTG series, are designed to produce a long flame for better heat distribution in firing radiant tubes. A primary air adjustment feature permits the burner applica-

CIRCLE NO. 129, PAGE 7-8

tion to full range of tube sizes and for any industrial gas. *Hauck Manufacturing Co.*

CIRCLE NO. 38, PAGE 7-8

Pressure die casting system providing venting of the die by vacuum before metal injection takes place is available on all sizes and models of line. System is said to give higher density, minimum porosity and better finish. *Kux Machine Co.*

CIRCLE NO. 47, PAGE 7-8

Temperature indicating colors are a series of pigments which assume color characteristics at definite levels. Most colors are permanent so that of test. Heating periods of 30 min. will give accuracy of ± 9 F. *Research Div. Curtiss-Wright Corp.*

CIRCLE NO. 39, PAGE 7-8

Portable bench is mounted on heavy duty casters and allows bench and tools to be taken to the work location. Unit weighs 325 lb and will support 2000 lb. Interior of bench contains shelves and drawers and "plug in" receptacles allow use of electrical tools. *Overbeke-Kain Co.*

CIRCLE NO. 40, PAGE 7-8

Tape dispenser is automatic and air-operated and handles tape widths up to 4 in, lengths to 21 in. When operator removes a length of tape a microswitch automatically sets in motion the next delivery cycle. *Air Fixtures, Inc.*

CIRCLE NO. 41, PAGE 7-8

Radiographic inspection machines, four sizes and portable, have steel penetrating ranges up to 5½ in. Three units are designed for heavy work, the fourth used for spot examinations. They are said to be dustproof, waterproof and shockproof. *Mitchell Radiation Products Corp.*

CIRCLE NO. 42, PAGE 7-8

Rotary abrasive belt grinder which operates wet or dry is designed for o.d. work. It will handle circular parts from 26 to 40 in. dia. Parts are moved across belt face by reciprocating device with a 7-in. oscillation stroke. *Engelberg Huller Co.*

CIRCLE NO. 43, PAGE 7-8

Conveyor features include a bed made of heavy-gauge, heat treated aluminum and a reversible movement of adjustable tension belt. The model comes in eight sizes ranging from 6 to 20 feet. Hinged mounting brackets

CIRCLE NO. 129, PAGE 7-8

allow unit to be hinged to the wall of a staircase. *Hytrol Conveyor Co.*

CIRCLE NO. 44, PAGE 7-8

Utility torch, oil-burning, may be used for heating, drying, melting, thawing, burning and disinfecting. A safety pressure check has been

incorporated into torch which produces a smokeless 2000 F flame. It is available in two sizes with 4 or 5 gal fuel tank. *Hauck Mfg. Co.*

CIRCLE NO. 45, PAGE 7-8

Precise measuring scale or rule is available up to 12 in. in length. It is subdivided into increments of 0.001 in. The accuracy is said to be 0.0001 in. or better. It is viewed through a simple type of microscope. Two sets of numbers are always in view. *Elliott-Myers Corp.*

CIRCLE NO. 46, PAGE 7-8

Sports Head Injury List

Who are the big ten in sports? You may name the Western Conference schools but to the Du Pont Company the list includes baseball, basketball, swimming, skating, hunting and the other popular participant sports. These common athletic activities accounted for more lost days than injuries in the plant.

Among its 100,000 employees Du Pont found that 515 were injured in sports while only 265 were hurt during working hours. All injuries off the job amounted to 4925.

Baseball headed the accident list with 202, basketball hurt 58 and swimming 43. Volley ball accounted for 11 injuries and hunting 21. Other sports accounted for 83 accidents resulting in loss of at least one day of work.

Du Pont believes that by applying safety rules and regulations to play as well as work that injuries can be substantially reduced.

let's get personal

O. Jay Myers . . has been named vice-president in charge of the foundry division, Reichhold Chemicals Inc., White Plains, N. Y. Formerly technical director of Archer-Daniels-Midland's foundry division, Myers is a vice-president of the American Foundrymen's Society and chairman of its Sand Division.

Frank C. Riecks . . has retired as technical assistant to the manager of foundries for Ford Motor Co. after 40 years' service. He has announced that he will join Sutter Products Co., Detroit, as executive vice-president. Riecks is a past director and honorary life member of the American Foundrymen's Society.

Herman Pneumatic Machine Co. has announced appointment of **L. C. Cairns** as purchasing agent. Also announced is the appointment of **H. H. and H. C. Reich** as exclusive representatives for the firm in North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, and Tennessee.

G. L. McMillin . . has announced that his organization will be known as Canadian Steel Foundries (1956) Limited. Firm was formerly known as Steel Foundry Div., Canadian Car & Foundry Co. Ltd.

Leo J. Masching . . brass foundry superintendent, Frank Wheatly Pump & Valve Mfr., Tulsa, Okla., has been recognized by the Tri-State Chapter, AFS, for his 50 years of service in the industry.

The twelve members of the Japan Foundry Industry Productivity Team now touring the U. S. recently visited the Foundry Technical Center, Des Plaines, Ill. Team members are: team leader S. Kawabata, G. Ushiyama, H. Oigo, H. Tsutsumi, I. Suzuki, H. Tamura, K. Miyashita, M. Aoki, G. Fuki, T. Muroya, K. Yoshimoto, and T. Aoki. Following the visit of this group, Hideo Honda, Chuetsu Metal Works, and M. Hamasumi, president of the Castings Institute of Japan, visited the AFS office.

Norman A. Matthews . . former assistant chief metallurgist, materials research and development unit of American Brake Shoe Co., has joined General Electric's metallurgical products department as research engineer.

Foundry Services, Inc., Columbus, Ohio, has named **John E. Gotheridge** technical service manager. New in the same division is **Jack W. Giddens**, technical service engineer.

Theodore W. Bossert . . has been named chief metallurgist of Aluminum Co. of America. He has been assistant chief metallurgist of the firm's metal manufacturing divisions

O. J. Myers

G. L. McMillin

F. C. Riecks

since 1951. Bossert joined Alcoa in 1923 as a member of the technical direction bureau at New Kensington, Pa.

William J. White . . former vice-president of Shallway Corp., has been appointed plant manager for Carver Foundry, Inc., Fairview Village, Pa.

A. C. Quist

Alfred C. Quist . . is now vice-president of E. J. Machine & Pattern Corp., West Springfield, Mass., an affiliate of Production Pattern and Foundry Co., Chicopee, Mass.

Archer-Daniels-Midland Co. has announced these appointments: **Julian A. Terpenning** has been made technical service engineer and will cover eastern Pennsylvania and Maryland, replacing Lancaster Foundry Supply Co. **Joseph Hekler** has been appointed sales representative in Central Michigan.

George M. Hartley . . has been appointed manager of marketing for General Electric's metallurgical products department.

H. Rosenthal

Hyman Rosenthal . . has been appointed director of research for Arwood Precision Casting Corp., New York.

Charles E. Gouin . . has resigned from Sorel Industries Ltd., Sorel, Que., to return to American Manga-

nese Steel Div., American Brake Shoe Co., Chicago Heights, Ill. Gouin is a director of the Eastern Canada Chapter of AFS.

Robert E. Woods, Jr. . . has joined St. Louis Coke & Foundry Supply Co. He is the third generation of his family to enter the firm which was founded in 1874.

J. Wright

Joseph Wright . . is now with the foundry division of Magnet Cove Barium as eastern foundry sales representative.

Belle City Malleable Iron, Racine Steel Castings Co., Racine, Wis., has reelected the following officers: Judson F. Stone, chairman; Charles S. Anderson, president and secretary; Ransom J. Swartout, vice-president and assistant secretary.

Harold C. Wagner and Thorald C. Alexander have new positions with Zirconium Corp. of America, Solon, Ohio. Wagner is now technical director and Alexander is chief engineer.

C. H. Beverly

Carl H. Beverly . . has been named treasurer of the Fanner Mfg. Co., Cleveland.

Clinton Walton . . president of Walton Foundry Co., Iola, Kansas, has received a pin from the Tri-State

Chapter of AFS recognizing his 50 years in the foundry business.

Edward C. Peterson . . has been elected vice-president, Rolling Mill Equipment division, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.

John Stobbs . . has been promoted to administrative manager of the Products, Inc., Cleveland.

J. G. Schaeffer

John G. Schaeffer . . has been appointed manager of manufacturing of the Oakland foundry of General Metals Corp., San Francisco.

Thomas G. Digges . . has been appointed assistant chief of the Metallurgy Division, National Bureau of Standards, Washington.

John Hunt . . has moved from Dominion Engineering Ltd. to join Canadian Bronze Co., Ltd. as industrial engineer. He is a past chairman of the Eastern Canada Chapter, AFS.

T. W. Fredericks

Todd W. Fredericks . . has been named general sales manager, Centr-O-Cast & Eng. Co., Detroit.

Charles G. Chisholm . . has been appointed general sales manager, Haynes Stellite Co.

Two General Electric Co. foundry department managers are now tour-

ing Europe. **A. E. Blake** and **J. T. Coggin** are now studying European techniques.

Symington-Gould Corp., Depew, N. Y., has appointed **Geoffrey Lyford** as safety director and has named **James Ewing** as medical and sanitation supervisor.

James K. Sprinkle . . has joined the Applied Research and Development lab of General Electric's Foundry Department.

H. Chapman Rose . . former Under Secretary of the Treasury has been elected to the board of directors of Basic Incorporated.

J. J. Punke . . has been named executive vice-president of the Precision Castings division of Harsco Corp., Syracuse, N. Y.

Arthur E. Hills . . has been named northern Ohio representative for Hitchiner Mfg. Co., West Hartford, Conn., die and investment caster.

Kits Available for Making Castings in the Basement

Tired of production line castings and want to do some precision work on your own? Then become a do it yourself hobbyist. A Kansas manufacturer advertises three kits with capacities up to 6 lb castings for less than $50 each. Either two-part sand molds or the lost wax processes are used.

Each of the three sets has the same equipment and is designed for operation on natural, manufactured or LP gas. The small motor blower operates on 110 ac or dc current. The equipment consists of a gas furnace and blower, fire clay crucibles, tongs, molding flasks, foundry graphite, molding sand, refractory lid, insulating lid and parting compound.

The smallest set is designed for castings up to 1½ lb with a crucible capacity of 6 cu. in., the second set handles up to 3 lb and the crucibles have a capacity of 12 cu in., the largest handles up to 6 lb with the crucibles each having a capacity of 24 cu in.

Patterns can be made from many objects around the house or from molding clay. Junk yards are a good source of metal.

Equipment Manufacturers Check Industry Progress

■ Over 120 members and guests of the Foundry Equipment Manufacturers Association gathered at the Greenbrier, White Sulphur Springs, W. Va., October 18-20 for their 38th Annual Meeting.

Competitors became compatriots in their desire to assist each other in problems basic to their industry.

The highlight of the meeting came when Rex Jennings, foundry supt., John Deere Waterloo Tractor Works,

Rex Jennings

the guest of honor, told the members "What the Foundry Expects of the Equipment Manufacturers".

Speaking from a background of 30 years experience, Jennings told them to build their equipment "rugged", intelligently analyze the customers needs, reduce gadgets, and sell the man who has to supervise the job.

According to the speaker, by 1965 demand for castings will be up 40 per cent while the labor force will increase only 14 per cent.

President D. E. Davidson presided over the business meeting. According to C. R. "Pete" Heller, executive sec.-treas. of FEMA, the association has grown from 25 members in 1919 to 59 member companies in 1956. The meeting was unique this year in that the representatives of the following trade associations were invited to attend: Foundry Facings Manufacturers Assoc., Steel Founders' Society of America, National Foundry Assoc., Malleable Founders Society, and the Gray Iron Founders Society.

Einar Borch presented two reports comparing business trends of the equipment manufacturers with that of the national economy.

C. V. Nass submitted a progress report on the Foundation's activities. According to his report the value of facilities in College Foundries have increased from $1,034,000 in 1947 to $2,444,250 in 1956.

Activities of the National Castings Council were summarized by Frank Steinebach.

pouring off the heat

its not all in the patent

■ In the September issue of MODERN CASTINGSS I noticed that you reviewed my Patent No. 2,734,818, covering a method for melting stainless steel in a direct-fired reverbatory furnace. I would like to emphasize the importance of heating the refractory of the entire hearth to 3000 F in order to tap the metal out at 2800 +F. To attain these temperatures one must have the proper combustion equipment, arrangement and operation.

CARL G. DE LAVAL
Mt. Lebanon, Pa.

improving public relations

■ My highest praise to MODERN CASTINGS for the manner in which you handled the story "Training Future Foundrymen in Portland". The publication of this item will do much toward furthering good community relations for both the Oregon AFS Chapter and Electric Steel Foundry Co.

BILL WALKINS
Editor, The ESCO Ladle

difference of opinion

■ I noticed an advertisement in the July edition of MODERN CASTINGS for the Australian magazine "Castings" which claimed that it is the only foundry journal in Australia with a complete coverage of the foundry industry. That, of course, is very incorrect. It has a circulation of barely 1,000 while the circulation of our journal, "Modern Foundry" is over 4,000.

BILL GIBSON
Gibson Engineering (Sales) Pty. Ltd.
Sydney, Australia

Well they say if it weren't for difference of opinion there wouldn't be any horse-races. Perhaps the basis for this argument arises from the fact that "Modern Foundry" is published three times a year while "Castings" comes out twelve times. On the basis of total annual circulation it looks like a photo-finish with 12,000 each!—EDITOR

CIRCLE NO. 123, PAGE 7-8

Metals Show at Cleveland Draws Crowd of 68,000

■ Cleveland claimed the title of metal center of the world during the week October 8-12 when the 38th National Metal Exposition was in progress in Public Hall. This annual activity of the American Society of Metals attracted over 68,000 guests.

The 1956 show was presented under the direction of Alfred O. Schaefer, Midvale-Heppenstall Co., Philadelphia, retiring president of the society. The technical papers and the

Dr. D. S. Clark

exhibitor's displays at the show indicate that the future of metals has already outstripped present needs of the earth-bound, and the metals industry is now preparing for space travel, according to Schaefer.

New ASM president is Dr. Donald S. Clark, professor of mechanical engineering at California Institute of Technology. G. MacDonald Young, Aluminum Co. of Canada, Montreal, was named vice-president. W. H. Eisenman was re-elected as national secretary, and Dr. Clarence H. Lorig, Battelle Memorial Institute, Columbus, Ohio, remains as treasurer.

Seven leaders in the metals field were honored with ASM medals.

Edgar H. Dix, Jr., Aluminum Co. of America, was presented the Albert Sauveur Achievement Award for work in aluminum alloys research.

W. H. Eisenman, national secretary of ASM, was chosen for the ASM Gold Medal.

Charles M. White, board chairman of Republic Steel Corp., was given the ASM Research Medal.

Three scientists shared in the Henry Marion Howe Medal Award. Dr. A. R. Troiane, Case Institute; Dr. W. J. Barnett, General Electric Co.; and Dr. R. P. Frohmberg, North American Aviation Corp. shared in the award for their joint paper on "Delayed Failure and Hydrogen Embrittlement in Steel."

Dr. Ernest P. Nippes, Rensselear Polytechnic Institute, Troy, N. Y., was given ASM's Teaching Award.

the editor's field report

by Jack Schaum

◗ **Encouraging Foundry Safety:** During a recent visit to Albion Malleable Iron Co., George Mott, our Technical Writer, learned about an interesting plan for encouraging plant safety. It seems the plant puts up a valuable prize—such as a TV set or shotgun—to be awarded each month by a drawing. However, only members of accident-free departments are eligible to have their names "in the hat" for the drawing. Another approach to safety comes from the Crouse-Hinds Co. in Syracuse. Any employee who has been saved from a serious eye injury by wearing safety glasses receives a certificate of membership in the Wise Owl Club of America and two Wise Owl pins. Your company can adopt such a program by contacting the National Society for the Prevention of Blindness. If you know of a good approach to stimulating safe practices in the foundry why not write me a short letter describing your plan.

◗ **Hydraulic Fluid Fires:** Many serious devastating fires are occurring when flammable petroleum-base oils from ruptured hydraulic lines are ignited by sparks, molten metal, flames, or hot surfaces. Increased automation, higher working pressures, and growing uses for hydraulic controls have only served to augment this hazard. Fortunately this fire-breathing dragon has been slain by the Chemical Industry with their invention of fire-resistant hydraulic fluids, known as "hydrolubes" and "phosphate esters". Foundries, die casters, heat treaters, and others can substitute these new fluids in their hydraulic systems and save lives, cut insurance costs, prevent property damage, and avoid production losses resulting from fires.

◗ **Precision Steel Castings for Aircraft Use:** What next, now that the Panel on Precision Steel Aircraft Castings has recommended that the Government should sponsor and subsidize a broad program for utilization of steel castings in aircraft? On a recent trip to Washington, I asked this same question of John Garrett, Chief Metallurgist in the Office of the Asst. Secretary of Defense, Research and Development. According to Garrett nothing startling has happened as yet. The Navy Dept. would like to see his office guide an integrated program of the three services. The Air Force is in the process of overhauling its castings research program with the recommendations of this Panel in mind. The Dept. of the Army plans no drastic changes in its activities. And as Garrett points out the $300,000 a year recommended for expenditure on foundry controls and techniques, mold materials and castings alloys has to come from somewhere.

◗ **Air Pollution Ordnance in Vancouver:** When our Technical Director, Sil Massari, visited the Vancouver AFS Chapter recently he found the old gang feeling pretty low. And for good reason, because the City Fathers had just enacted an Air Pollution Ordnance, largely patterned after the almost-impossible-to-comply-with Los Angeles law. Faced with these unreasonable regulations, effective January 1, the foundrymen have appealed to AFS for assistance in filing an appeal to modify the Ordnance. Herb Weber, AFS Air Pollution Expert, left immediately by plane for British Columbia to review the Ordnance and prepare an appeal to the city officials. It is unfortunate that AFS was not called on for advisory assistance earlier. Experience has proven that the time to reason with officials is before, not after an Ordnance has been passed. Don't let this happen to you! Call on your National Headquarters for assistance early. That's what we're here for.

◗ **Melting Metal With Sunshine:** Just as irrigation has turned the desert into an agricultural paradise so might the focusing of unlimited kilowatts of sunlight into a furnace spawn a new industrial movement into areas with a clear, hot, dry climate. Already solar furnaces capable of melting over 200 lb of steel are in operation and larger ones to come. For more details on the possibilities of this unusual development read this issue of MODERN CASTINGS.

new books

Elevated Temperature Properties of Coppers and Copper-Base Alloys (ASTM Special Technical Publication No. 181) . . Prepared by C. Upthegrove and H. L. Burghoff. 244 pp. American Society for Testing Materials, 1956. $5.50.

Data for coppers are limited to wrought materials, but data for alloys apply to cast and wrought materials. Graphical data includes modulus of elasticity, tensile strength, yield strength, reduction of area, elongation, stress for creep rates of 0.000001, 0.00001, and 0.0001 per cent per hour and stresses for rupture in 100, 1000, 10,000 and 100,000 hr.

Powder Metallurgy . . Report of the Technical Assistance Mission No. 141. 309 pp. Published by European Productivity Agency of the Organization for European Economic Co-Operation. 1955. Available from O.E.E.C. Publications Office, 2000 P street, N.W., Washington 6, D.C. $3.

Report of the Powder Metallurgy Mission, comprised of twenty-eight members representing seven European countries—Belgium, Denmark, France, Germany, Italy, Netherlands, United Kingdom. Mission was split into four groups based upon technical interest: I. Electrical and magnetic materials, II. Hard Metals, III. Refractory Materials, IV. Engineering powders and structural parts. Report summarizes findings of group after visits to forty-three plants and research laboratories. This should be a very worthwhile publication to anyone interested in the subject of powder metallurgy.

ASTM Standards on Light Metals and Alloys, Cast and Wrought . . 3rd ed. 276 pp., American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa., 1955, $3.50 to non-members, $2.65 to members.

Aluminum and Aluminum Alloys, Magnesium and Magnesium Alloys, Cast and Wrought. Standards include ingots, castings, bars, rods, wire, forgings, pipe and tube, sheet and plate, wrought products for electrical purposes filler metal, electroplating, and general methods of test. ASTM codification system for light metals and alloys.

The Mechanics of Engineering Soils (2nd ed.) P. Leonard Capper and W. Fisher Cassie, 315 pp. McGraw-Hill Publishing Company, 330 West 42nd St., New York 36, N.Y. 1954, $6.50.

A revision of the book written in 1948 to gather together the known facts and theories of soil mechanics. The sections on shearing resistance, bearing capacity, pavement design and flow nets have been rewritten and a new section on soil suc-

tion has been added. Chapters include: Definition and scope of soil mechanics; Classification of soils; Soil moisture; Compressibility and consolidation; Shearing resistance; Earth pressure; Stability of slopes; Stability of foundations; Settlement of foundations; Pile foundations; Roads and runways; Drainage problems; Site exploration, sampling and testing.

Basic Effects of Environment on the Strength, Scaling, and Embrittlement of Metals at High Temperatures . . 114 pp. American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa., 1955, $2.75.

Symposium sponsored by General Research Panel of the ASTM-ASME Joint Committee on Effect of Temperature on the Properties of Metals. Data on oxidation and surface effects and creep under controlled conditions.

Powder Metallurgy—Now (New Techniques, Improved Properties, Wider Use) . . F. V. Lenel, 34 pp., American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa., 1955, $1.50.

Fourth Gillett Memorial Lecture in which author discusses and evaluates some of the developments in powder metallurgy since World War II. 32 references.

Development of Improved Titanium-Base Alloys . . Herbert A. Robinson, W. Maxwell Parris, Paul D. Frost, 96 pp. Office of Technical Services, U. S. Department of Commerce, Washington 25, D.C. PB 111988, 1955, $2.75.

Results of research designed I. To investigate the properties of new alloys having compositions different from that of the Ti-3Mn-complex alloy, II. To investigate fully the effects of hydrogen on the tensile properties, especially ductility, of the Ti-3Mn-complex alloy, III. To evaluate in further detail the properties of the Ti-3Mn-complex alloy, particularly with respect to elevated-temperature strength and stability.

Magnesium Fabricating and Casting . . Report of the Technical Assistance Mission No. 4. 83 p. Published by European Productivity Agency of The Organization for European Economic Co-Operation. 1956. Available from O.E.E.C. Publications Office, 2000 P Street, N.W., Washington 6, D.C. $1.25.

Details of U.S. Production and Use of Magnesium and Its Alloys. Comparisons of some European and U.S. methods. This should be a very useful report to those interested in magnesium.

Panel Discussion on Pyrometric Practices (ASTM Special Technical Publication No. 178) . . 78 pp, American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa. 1956. $1.50 to nonmembers; $1.15 to members.

Panel discusses work in defining the precision of temperature measurement and control which can be recommended or specified in high-temperature test work and is concerned with ASTM recommended practices on high-temperature

testing of metals E 21, E 22, and E 85. Papers included are: "Thermocouple Immersion Errors," by J. M. Berry and D. L. Martin; "Summary of Pyrometric Procedure Employed by One Company in Creep-Rupture Testing and an Analysis of Results Obtained," by W. E. Leyda; and "Creep and Rupture Test Pyrometry," by C. R. Wilks.

Symposium on Atmospheric Corrosion of Non-Ferrous Metals (ASTM Special Technical Publication No. 175) . . 158 pp. American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa. 1956, $2.75 to non-members; $2 to members.

Reports of tests conducted on 24 wrought alloys of zinc, nickel, copper, lead, tin, and aluminum. About 9000 test specimens were exposed at nine different localities across the country and evaluated after 1, 3, 6, 10, and 20 years. Nine papers discuss the significance of these results in each metals field.

ASTM Standards on Copper and Copper Alloys . . 654 pp. American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa. Dec. 1955, $5.75 to non-members, $4.40 to members.

Compilation of all ASTM Standards on copper and copper alloys, cast and wrought, and related standards developed by committees on wires for electrical conductors and non-ferrous metals and alloys. Includes 127 ASTM Standards—110 specs, 12 test methods, 2 recommended practices, 2 classifications and 1 definition of terms. Fifty of the specs have been revised and a new spec for threadless copper pipe has been added since the previous edition.

Symposium on Metallic Materials for Service at Temperatures Above 1600 F (ASTM Special Technical Publication No. 174) . . 193 pp. American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa. 1956. $3.50 to non-members, $2.65 to members.

Symposium, sponsored by the General Research Panel of the ASTM-ASME Joint Committee on Effect of Temperature on the Properties of Metals, attempts to provide a basis of evaluation of a number of metallic materials, including cermets, which have been undergoing study in laboratories both here and abroad, to determine their suitability for higher temperature service. Papers discuss as many as possible of the properties—physical, chemical, and mechanical—as well as methods of combating surface deterioration that are affected by temperature.

NANCY EDDY, *Librarian*
American Foundrymen's Society

MORE FACTS on all products, literature, and services shown in the advertisements and listed in Products & Processes and in For the Asking can be obtained by using the handy Reader Service cards, pages 7-8.

Mg Association Studies Earth Satellite

■ The 12th Annual Convention of the Magnesium Association went right out of this world during a featured talk on the magnesium-skinned earth satellite. This session, as well as more down-to-earth technical discussions, took place at Chicago's Drake Hotel, October 4 and 5.

President D. T. Wellman, Wellman Bronze & Aluminum Co., presided at the sessions. Other officers of the group are: J. E. Pepall and P. B. Craighead, vice-presidents, and J. V. Cosman, treasurer. Jerry Singleton is executive secretary.

R. E. Short, Kleinschmidt Laboratories, Inc., presented "Magnesium As Used in High Speed Teleprinters," a paper in which he discussed a military teleprinter which employs sand cast magnesium frames. All castings used in the machine are AZ 63A alloy in the heat treated and aged (T6) condition. The principal defects encountered in these castings, Short said, are flux inclusions and the presence of iron in the casting surface.

Magnesium castings in small electric motors were discussed by J. W. Tweedy, Redmonds Motors Co. His report showed the competitive advantages gained by switching from gray iron to magnesium castings. The parts converted to magnesium die castings include stators, stator shells, and end frames.

Weight-saving was the cause of introducing magnesium castings to the manufacture of another electrical apparatus—the Dictaphone. Frederick W. Roberts, The Dictaphone Corp., reported on the use of magnesium in portable tape recorders and dictating machines. Roberts reported one fire caused by a tool striking a sand inclusion in a casting. He stated that this problem will not recur, since all castings are now die cast.

Problems in finishing magnesium castings were discussed in the paper, "Magnesium in Military Electronics," presented by Arthur Maynard, General Electric Co. Maynard also discussed the use of magnesium castings as gears and shafts.

A proposal to change specifications for magnesium castings was presented in "Effect of Section Thickness and Microstructure On AZ91 H.T.A. Magnesium Castings." Author John K. Dietz, Chance Vought Aircraft, Inc., presented evidence to establish the need for a specification that would "reflect the attainable properties in various sections rather than the existing specifications which have requirements that cannot be met in all cases."

MELTING METAL with SUN-POWER

D. C. Halacy, Jr. / *Scientific Member*
Association for Applied Solar Energy

Industry studies solar furnace for low-cost, high-temperature melting

Will the sun soon be on foundry payrolls?

The saying that there is nothing new under the sun pertains even in the field of melting metals and other materials. As early as 1745, Louis XIV earned the title of "Sun King" when one of his scientists melted iron and silver with a solar furnace. Politics of the day proved hard on another researcher, when Lavoisier was beheaded in the Revolution because "the Republic has no use for scientists!" However, M. Lavoisier did succeed in melting platinum and must have reached temperatures of about 1750 C (3182 F). He also noted prophetically that "the fire of ordinary furnaces seems less pure than that of the sun."

Fortunately the climate is healthier for science today, and another Frenchman, Dr. Felix Trombe, continues the good work with his co-worker, M. Foex. Still doing the trick with mirrors, they achieve temperatures greater than 3000 C (5400 F) and use them to melt refractory materials and metals commercially.

This is done at the Solar Energy Laboratory at Mont Louis in the Pyrenees, site of an old fort. Using a parabolic reflector 35 ft in diameter, Trombe melts in loads of up to 220 lb at a time. Costs run about 75 per cent of an electric arc furnace, and if the laboratory operated commercially only, it could have written off the cost of the furnace in the last five years.

With a power of 75 kilowatts, the large furnace is used about 30 days a year for commercial melting. The rest of the work is experimental, and so satisfied is the French National Center of Scientific Research that it is now building a huge, 200 ft mirror which will have an output of 1000 kw.

Interest in solar furnaces has increased greatly in the United States during the last two years, and has resulted in formation of the Association For Applied Solar Energy which lists top industrial names on its board of directors. Stanford Research is conducting research into the feasibility of solar furnace use for industry, and a team of experts is now in France studying the French furnace.

As a background for considering such a device for melting, let us first consider its source of power:

The sun is an orange dwarf star, 93 million miles distant. Energy, believed released by fusion of hydrogen, reaches us with a heat equivalent to a black body radiating at about 6000 K (11,000 F). This results in energy being received on the earth's surface at approximately 0.1 watts/cm². The task of the solar furnace is to concentrate this energy sufficiently to produce high temperature and heat flux.

Although California Institute of Technology has a furnace using an array of 19 lenses, most of the world's solar furnaces are single parabolic reflectors ranging in size from five to 35 ft. A number of optical factors enter the problem, among them the apparent diameter of the sun, which is about 32 minutes of arc. These factors limit ultimate concentration and result in an image size of focus of approximately 1/200th the diameter of the reflector. It is within this image that heat flux is available, and melting takes place.

Heats of 200 lb are melted using 35 ft parabolic reflector with costs running 25 per cent less than for electric furnaces.

Pol Duwez, professor of mechanical engineering at Caltech, recently presented an ASME paper on the subject. Using realistic figures, he arrives at an ideal maximum attainable temperature of 4900 K (9315 F). This would give a heat flux of 35,000 cal/cm²/min. Further, Professor Duwez feels that 15 feet is about the maximum practical diameter for a one-piece reflector.

Most furnaces in the United States have been converted from searchlight mirrors of optical glass, five feet in diameter. The largest, used by Convair for high-temperature materials research, is ten feet in diameter, of polished aluminum. This has an output of 4.5 kw. Above this size, a number of small mirrors are arranged to form a reflector of the size desired; 3500 flat mirrors, cupped by adjusting screws, are used in the large French furnace.

Experiments have been made with rotating bodies of mercury, generating an alterable parabolic reflecting surface for controlling temperature. In Japan, parabolas have been produced by floating plastic on a rotating vessel of water and allowing it to solidify. However, the bank of small mirrors seems the logical choice for a large, industrial furnace.

As the sun moves across the sky, it is necessary to track it so that its rays may be properly focused. This can be done with the parabolic reflector itself, or an auxiliary flat mirror called a heliostat. Obviously this latter system is more satisfactory since the focal point is fixed. In general, equatorial mounting is used and the mechanism can be of the astronomical, clockwork type, or utilize photo-electric cells coupled to the drive motor. The Convair furnace uses the first method; the French furnace the second.

To control temperature, Convair uses a sliding tubular shield and reports it can hold within plus or

minus 1 degree at 2000 C (3632 F). Dr. Trombe interposes a panel between the heliostat and parabola to effect the same purpose. Small models of the U. S. Air Force's planned 200 ft. furnace use a shutter arrangement to govern light received on the parabolic reflector.

Measurement of high temperatures poses a problem, and it is estimated that optical pyrometers are accurate only to plus or minus 50 C when a temperature of 3000 C (5432 F) is reached. Dr. Trombe feels that the best assurance of having reached a temperature is the actual melting of a substance with that melting point! High-energy flux is usually measured by using water-cooled black-body cavities and checking the rise in water temperature.

Geographical location of the solar furnace installation is of great importance. Stanford Research in a survey recommended a mountain near Phoenix, Arizona as an ideal site. The Association For Applied Solar Energy is located in Phoenix, and plans to build a large furnace there soon. The 200 ft Air Force furnace will be built at Cloudcroft, N. M. at an altitude of 9000 ft.

For an example of the difference in heat energy received in various parts of the country, New York City gets an average of 0.30 kw-hr per sq ft/day; while El Paso receives 0.60/day. In the desert sections of the United States, 300 useful days a year are probable. Dr. Trombe reports 2750 hours of operation in the Pyrenees mountains.

In the United States, Convair uses the solar furnace in work with metals, "cer-mets", ceramics, zirconium dioxide, boron nitride and other materials. General Electric purifies phosphors for use in communications equipment. Others using furnaces are Kennecott Copper, Sandia Corp., U. S. Bureau of Mines, and Dupont. Besides these, a number of schools, including Arizona State with the first heliostat-equipped furnace in this country, use the solar furnace for research and on government contracts.

A furnace in Algeria, 27 ft in diameter, is used to fix nitrogen from the atmosphere, and for other purposes such as the fusing of alumino silicates. Russia has a large furnace at Tashkent, probably even larger than the French furnace, but Dr. Trombe has apparently done the most both in research and commercially with his big mirror.

Built in 1946 in an old fort at Mont Louis, the Trombe furnace cost only $60,000, (not including auxiliary equipment) and has stood up well despite its exposure. The glass mirrors require no maintenance, and even high winds have not disturbed the installation. Although it is of huge size for a 75 kw furnace, there are a number of redeeming features.

With the exception of atomic explosion, or the "shock tube", both of extremely short duration and possessing other obvious drawbacks; and the high-intensity arc image which will be discussed later, the solar furnace gives the highest heat known. This heat is delivered at no cost for power.

As Lavoisier noted two hundred years or so ago, solar heat is pure heat. There is no carbonization, no chemical action. There are no electrodes, no magnetic or electrical fields. Operation in a controlled atmosphere is simple, and cavity heating in centrifugal furnaces from the core outward is practical.

Although Trombe attains higher temperatures with his smaller furnaces, and has worked out interesting movable carriage systems for melting powders and so forth, we will consider mainly the large furnace and the rotating cavity furnaces since it is these he uses for melting in loads of 66 lb of refractories, or 220 lb of metal at a time.

These centrifugal furnaces have capacities up to 52.5 qts, and openings to admit radiation about 3.9 in wide. Rotating at from 125 to 750 rpm, the furnaces are water cooled by an external jacket and are very useful in purifying operations since the molten metal can be isolated from the walls.

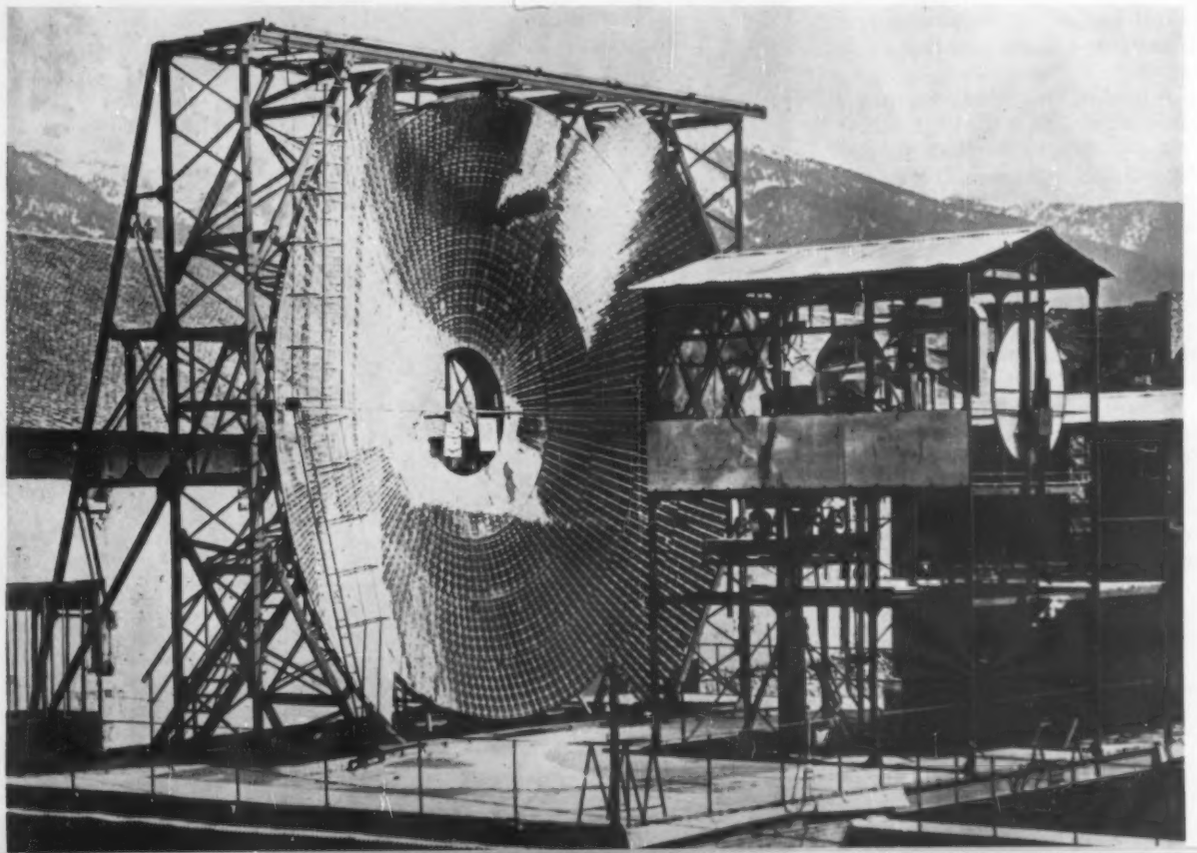
As previously mentioned, work can be performed in a conditioned atmosphere, using pyrex or quartz. In tests, Trombe has reduced chromium oxide in hydrogen or in a vacuum at 2000 C (3600 F).

While the large furnace is not the most efficient of the French Solar Energy Laboratory, it does concentrate more than 80 per cent of the energy in an image about 4.4 in. diameter with a flux density of 1600 watts/cm² and a temperature in the neighborhood of 3300 K. It is interesting to speculate on the performance and capacity of the 200 ft furnace being built, since it will gather 30 times more energy. With power equivalent to a 1300 hp generator, Trombe expects his new furnace to melt for half the cost of electric arc.

An interesting possibility lies in the development of the high-intensity carbon arc-image furnace, although to date these are very inefficient, converting only 1 per cent of the electrical energy into heat at the focus.

Stanford Research speculates on the possibility of using thirty-six 200 kw arcs, each with a 2.5 ft mirror and all directed at an eighteen ft mirror. This would give the same flux as a ninety ft solar mirror and obviate such a huge installation as that planned by both France, and our Air Force. It has been reported that temperatures up to 10,000 K have been attained with high-intensity arc, and the British and Germans both have made arcs of up to 600 kw. However, these are not attainable in this country, and Stanford Research admits much work must be done before the idea would be feasible.

Highest heat known is produced without carbonization or chemical action in French furnace built in 1946.



HOLLY and SAND go Hand in Hand

C. R. Wolf / *President*
New Jersey Silica Sand Co.

Hobby started in sand company woodlot has become world's largest private holly orchard

Editor's Note:

Many foundrymen have interests, abilities, and accomplishments in other fields than the foundry. One such "fellow man" is C. R. Wolf. Modern Castings *has asked him to write the story of his holly-growing hobby. If you enjoy reading this or know of other foundrymen with interesting hobbies, write a letter to the Editor.*

"What a wonderful sight." "Amazing!" "Who would have thought that holly trees could be so beautiful!" These are just a few of the comments made by hundreds of visitors to our holly orchard in Millville, New Jersey.

These visitors have come from practically every state and many foreign countries. Included are horticulturists, scientists, doctors, *foundrymen*, and the interested public.

Many questions have been asked. "How did you happen to start such an interesting hobby?" "Where did you get the trees?" "How old are they?" "When was the orchard started?" "Isn't holly a slow grower?" "Where can I get several trees?" We will try, in this story, to answer these questions and more.

The holly idea started with us in 1926 when a few boxes of holly sprigs were cut from company owned woodland and given to friends at Christmas. This practice grew each year until it was decided in 1939 to plant an orchard.

Perhaps, too, the holly hobby at the New Jersey Silica Sand Company was stimulated by Robert Southey's verse "But when the bare and wintry woods we see, what then is so cheerful as the holly tree," or perhaps the symbol of holly at Christmas which dates back to the time of the Romans and their festival of Saturnalia.

The trees for this orchard were, for the most part, found growing in the wild on company property. As the heavy equipment would strip off the overburden to mine the silica and molding sands beneath, the hollies were saved and transplanted in an adjoining field which is now the orchard. A few trees were also secured from nurseries.

A total of 2800 trees were planted during 1939 and 1940. These trees are now approximately 16 to 18 feet in height and are pruned each Christmas. (This is proof that holly is not a slow grower.) The pruned sprigs are given to friends to decorate their homes for the holiday season.

This hobby has grown until now we have the largest private collection of hollies in the world.

Every holly tree must be carefully planted. It is well to remember, plant a ten dollar tree in a fifty dollar hole, not a fifty dollar tree in a ten dollar hole. In other words, dig a large hole and fill in around the plant with good rich top soil and peat moss. Water thoroughly to firm the soil mixture around the roots of the newly planted tree. Remember to give plenty of space for the tree to grow. Holly trees grow from fifteen to twenty feet tall and have a spread nearly equal to their height.

Much research is conducted on holly in our orchard. As a result of this research eleven new varieties have been developed and released to the nursery trade.

Holly trees, unlike most plants, resemble people to the extent that they are either male or female. The blossom of the female holly tree, when pollinated, forms the berry, while the male tree does not bear berries. The male tree's flowers bear the pollen which makes it possible for the female tree to have berries. For this to take place, the male tree must be near enough to the female tree for bees, wind, and other natural carriers of pollen to transfer the pollen. As a general rule, the closer the male tree is

Foundrymen have aided in promoting holly as a hobby. It is being grown not only along the east coast but in the west and midwest.

planted to the female tree the more berries the latter will bear.

Close examination of the female flower reveals a large greenish knob in the center of the flower which is called the pistil. The stems about the pistil are called stamens, which are small and withered on the female flower. On the other hand, the stamens are large and plumb on the male flower and are full of pollen while the pistil is very small. Both are very fragrant.

George Washington's diary tells how he planted holly seeds to raise the holly hedge at Mount Vernon. Holly seeds may be planted, but they require one to two years to germinate, and at least five more years to blossom to determine whether the plant is male or female. The most desirable method to propagate is with vegetative cuttings.

The American holly can well be a versatile plant in the hands of a landscape gardener. It can be used as a shrub, hedge, or a tree in the formal garden as well as into the naturalistic landscape development. The people of Portland, Oregon, have been planting hollies for many years at the request of landscape architects. It is estimated over 70,000 hollies are now planted in this beautiful city. Holly blossoms were supplied for table decorations during the 25th Anniversary of the Millville Kiwanis Club.

American holly is growing as far north as Rochester, New York, and parts of New Hampshire, and south to Florida. It is also growing in many parts of the midwest and west.

Holly trees are pruned to give a more symmetrical shape. Prune your holly during the Christmas season when it is not harmful and use the sprigs for decorating the home.

Many foundrymen visit the holly orchard and become intensely interested in the holly hobby. This is especially true during the annual open house which is always held the first Sunday in December. One took home a small tray of cuttings to try his luck at propagation. His results were outstanding and he has raised for sale over 5000 hollies each year since to supplement his income.

Another foundryman has purchased five acres of land and has it planted in hollies to supply sprigs to the Chirstmas trade.

One foundryman is collecting different varieties of hollies and has them planted around his home. To date he has over 25 varieties in his plantings.

Today as this paper is being written, a man from central Pennsylvania who has a planting of Christmas trees as a hobby, visited our orchard for information. He wishes to also plant an orchard of holly. As you can see, the holly hobby idea is rapidly spreading. Several orchards in Oregon and Washington had their beginning as hobbies.

To promote more interest in holly, The Holly Society of America was incorporated in 1947. Today the society, with the author as its president, boasts of members in nearly all states with its purpose to promote the use and cultivation of holly. Another goal of the society is to promote research in the field of holly and conservation of native hollies.

So stimulating has this hobby become that friends began collecting various decorative items with a holly motif and send them to the author. As a result, a holly china collection of over 600 pieces has been accumulated. Most of these pieces of china are antiques and are displayed in the company office.

Located in the center of the forty acre holly orchard is a farm house built in the early 1800's. This house has been remodeled as a holly guest house. Everything as far as possible carries the motif of holly. The lamps, china, glassware, candlestick holders, and even the ash trays are decorated with holly. Many a mold has been rammed and poured by foundry friends relaxing in the beautiful surroundings of hollyhouse.

The scope of interest in holly is illustrated by the fact that the Baltimore & Ohio Railroad located a beautiful specimen holly tree along their main line between Baltimore and Philadelphia in Jackson, Maryland. The tree which was purchased by them is approximately 60 feet in height and is 24 inches in diameter at breast height. The age is estimated at 250 years. It has an excellent symmetrical shape and is decorated each Christmas with hundreds of balls and lights. Many thousands of people attend the special lighting ceremony held each year in mid-December.

Enthusiasm for holly extends even to farm guest house in center of orchard where motif is also seen on 600 pieces of china.

Another prominent tree is located at Indian Steps in York County, Pennsylvania. Legend has it that the early Indians used its berries for bartering with other tribes.

A tree has been located near Ocean City, New Jersey, which is approximately 300 years old. When the new Garden State Parkway was built, the tree was left remaining between the north and south lanes of traffic. Extending four miles south from this tree, over 1100 hollies have already been planted along this new parkway.

A mile of beautiful hollies have been planted by the Richmond Garden Club just north of Richmond, Virginia, on Route No. 301. The oldest holly on record is located just off Route No. 17 north of New Bern, N. C. This granddaddy tree is 72 feet high and over 11 feet in circumference at breast height. Its age is estimated at 450 to 500 years.

Also, during your travels it would be a splendid sight to see Pinehurst, North Carolina, where hollies are planted for shade trees. These trees, planted in 1895, have been pruned free of branches to a height of eight feet. They are now over 25 feet in height and add much to the beauty of the city.

Space does not permit more detailed information regarding the culture and propagation practices. So for more detailed information on this or the Holly Society of America, please contact the author.

Foundrymen, plan for your retirement hobby! Holly is certain to keep you enthused, make your eyes sparkle, blot out ailments and worries. It will give you something which will allow you to say "This is mine; I did it." Come see us the first Sunday in any December! and MERRY CHRISTMAS!!

Acknowledgment

■ The author would like to acknowledge the invaluable assistance of Daniel G. Fenton, horticulturist for the holly orchard, in preparing the technical part of this article.

W. T. Unfried / *Ass't Metallurgist*
Texas Electric Steel Casting Co.

Present laboratory equipment and usual procedures may be used with these analyses.

A COMPLETE SLAG ANALYSIS in 45 MINUTES

Texas Electric Steel's rapid chemical procedure gives steel melters a new tool for quality control

Which came first, the slag or the steel? As is the case with eggs and chickens, you can't have one without the other and it probably doesn't matter which came first. Steelmakers do know that it is their control of slag that determines the quality of their steel.

Steel melting is a refining process in which an oxidizing condition is created which dissolves the oxides of such elements as carbon, manganese, silicon, and phosphorus into the slag. The analysis of the slag is then used to indicate the quality of the steel.

Texas Electric Steel Casting Co. uses basic electric steel melting, a two-slag process which permits the removal of both phosphorus and sulphur. With electric melting, melts will be produced in one to one and one-half hours, so the analysis of the slag must be made rapidly if it is to be of any value in control.

The following chemical methods have been used successfully for analyzing basic electric furnace slags. They should work equally well on most other basic slags and will make it possible for one chemist to analyze for the oxides of silicon, calcium, manganese, and iron in about 45 minutes. The oxides of magnesium, phosphorous, and chromium are also obtained very rapidly if desired.

In all cases, the total element present is determined and calculated to the percent of its most prominent form. For instance total iron is calculated to percent FeO only and not to FeO + Fe_2O_3. Calcium is calculated to CaO although it may also be present as some other form of calcium in the slag.

Sample weights have been chosen that can utilize standard laboratory solutions already prepared. The methods have been designed to fit into the daily laboratory practice and cause as little interference as possible.

Precautions

All precautions involving the use of perchloric acid should be followed. Anyone not familiar with its applications should read the discussion on perchloric acid in the 1950 edition of *A.S.T.M. Methods of Chemical Analysis of Metals.* The two main precautions to be observed in these analyses are: always use nitric acid with the perchloric, and have a hood completely lined with an inorganic substance with as simple an exhaust system as possible. A hood and flue that can be washed down daily with water is ideal. If a wash down hood is not used the flue and baffles should be brushed out regularly.

Sample Preparation

Crush the slag using a porcelain mortar and pestle. Pass a magnet through the slag frequently to remove any occluded iron. Continue crushing until the slag will pass through a 100 mesh sieve. In rou-

TO ANALYZE . . . USE THESE SOLUTIONS

SILICA	*Hydrochloric Acid Wash* 75 ml HCl to 1000 ml water.				
CALCIUM OXIDE	*Ammonium Oxalate* 4% in water.	*Dilute Sulphuric Acid* 1-6.	*Potassium Permanganate (Standard)* 7.8 gm to 3500 ml. water. Mix one week in advance and filter through asbestos before use. Standardize with sodium oxalate.		
MANGANESE OXIDE	*Acid Mixture* 250 ml water, 50 ml sulphuric acid, 75 ml phosphoric acid, 100 ml nitric acid, 25 ml 5% silver nitrate solution.	*Ammonium Persulphate* 150 gm ammonium persulphate to 1000 ml water. Keep in stoppered bottle and mix fresh every 2 or 3 days.	*Sodium Arsenite (Standard)* Dissolve 35.5 gm anhydrous sodium carbonate in 400 ml boiling water. Add 11.70 gm arsenious acid (As_2O_3). Cool and dilute to 10,000 ml.		
IRON OXIDE	*Sulphuric - Phosphoric Acid Mixture* 750 ml water, 500 ml sulphuric acid (allow to cool somewhat), and 500 ml. phosphoric acid.	*Potassium Dichromate (Standard)* 2.05 gm to 1000 ml water. Standardize with pure iron wire.	*Stannous Chloride* 12.5 gm stannous chloride in 15 ml HCl. Heat until dissolved and solution clears. Pour into 75 ml cold water. Keep several pieces of mossy tin in the bottle.	*Indicator* 1.0 gm diphenylamine dissolved in 100 ml concentrated H_2SO_4.	*Mercuric Chloride* Saturated solution of $HgCl_2$ in water.
PHOSPHOROUS	*Sodium Sulphite* 57 gm of the anhydrous salt dissolved in 1000 ml cool water. Do not use for more than one week.	*Ammonium Molybdate* 300 ml sulphuric acid to 700 ml water. Cool to 122F (50C) and add 20 gm ammonium molybdate. Mix well.	*Hydrazine Sulphate* ¾ gm hydrazine sulphate to 500 ml water. Do not keep over 30 days.	*Dilute Perchloric Acid* 40 ml acid diluted to 1000 ml.	
CHROMIUM	*Potassium Permanganate (Standard)* 7.8 gm to 3500 ml water. Mix one week in advance and filter through asbestos before using.	*Ferrous Ammonium Sulphate (Standard)* Add 450 ml sulphuric acid to 900 ml water. When cool add 225 grams ferrous ammonium sulphate. Dilute to 9000 ml.	*Sulpsuric - Phosphoric Acid Mixture* 750 ml water, 500 ml sulphuric acid (allow to cool somewhat), and 500 ml phosphoric acid.		

tine work drying the sample at 110 C may be omitted if periodic checks show the moisture to be less than one percent.

Basic Treatment

Weigh a 500 mg sample into a 250 ml Erlenmeyer flask that already contains 25 ml of a 4 per cent boric acid solution. Swirl the flask immediately to prevent the slag from caking on the bottom. If no fluoride-containing compounds such as spar have been added to the slag during the melting operation, then the boric acid may be omitted but should be replaced by at least 15 ml of water. The boric acid will prevent any fluoride in the slag from volatilizing the silica present.

Add 20 ml of perchloric acid followed by a few drops of 1-2 nitric acid. Boil on the hot plate until dense white fumes of perchloric acid clear from the bottom of the flask and are seen only in the neck. Swirl the flask frequently during the boiling to keep any silica down in the acid. Fume for a few minutes, then remove from the hot plate, cool in air, then in water until cool enough to handle easily. Add about 20 ml water and mix well.

Note: solutions for use in the following analyses are in the table above.

Silica

Procedure: Filter the solution through an 11 cm Whatman 41-H filter paper or equivalent into a 100 ml volumetric flask. Use suction and support the paper on a platinum cone. Rinse the inside of the Erlenmeyer several times with hot water and pour through the funnel. Do not be concerned at this point with any silica adhering to the inside of the flask.

Remove the volumetric flask and place in a cooling bath. Place another flask under the funnel. Rinse the silica from the Erlenmeyer flask using a rubber policeman to scrape it loose if necessary. Wash the silica and filter paper several times with hot HC1 wash solution, and then several times with hot water. Ignite the silica and paper in a clay annealing cup at 1300-1500 F. When cool empty onto balance pan and weigh.

$$\% SiO_2 = \frac{\text{Wt. } SiO_2}{\text{Wt. Sample}} \times 100$$

When the master solution from the silica separation has cooled, dilute to the mark, mix well and reserve for the remainder of the analyses.

Calcium Oxide

Procedure: Transfer 20 ml of the master solution reserved from the silica determination to a 500 ml wide mouth extraction flask (Soxhlet flask). Add 150 ml water, neutralize with ammonium hydroxide

Electric furnace melting means slag analyses must be done fast to be useful.

A Complete Chemical Analysis in 45 Minutes

■ A streamlined procedure giving time-saving chemical analyses for the ferrous foundry was published by Mr. Unfried in Modern Castings, April, as "A Complete Chemical Analysis in 45 Minutes." The easy-to-use chart of solutions for those analyses has been reprinted. Single copies of the chart are free, additional copies, 10 cents.

and add about 2 ml in excess and bring to a boil. Add 20 ml hot ammonium oxalate solution and boil for 1 min. Then add about one gm dry oxalic acid and boil for 3 min. If any brown iron precipitate does not dissolve, add a little more oxalic acid. If a large excess of oxalic acid is necessary it is an indication that too much ammonium hydroxide was added in the beginning.

Remove from the hot plate, cool in water bath, and filter with suction. Use a No. 3 porcelain Gooch crucible with a double glass fiber filter mat. Rinse the inside of the flask well being sure all the precipitate is transferred to the crucible. Wash well with cold water to remove all soluble oxalates, but avoid a large excess of water as the calcium oxalate is slightly soluble.

Carefully remove the mat and precipitate and place back in the thoroughly rinsed Soxhlet flask. Rinse the inside of the crucible with a stream of 1-6 sulfuric acid catching the washings in the Soxhlet flask, Add 150 ml water and 5 ml con sulfuric acid. Heat to 70-80 C. Be sure all the precipitate has dissolved, then titrate while hot with standard potassium permanganate.

Calculation: Standardize the potassium permanganate by weighing several 0.100 gram samples of sodium oxalate into 500 ml Soxhlet flasks. Dilute to about 150 ml with water; add ml con H_2SO_4, heat to 70-80 C and titrate with potassium permanganate.

0.1000g. $Na_2C_2O_4$ = 0.0472g. $KMnO_4$
0.1000g. $Na_2C_2O_4$ = 0.0420g. CaO

0.0472g. $KMnO_4$ = 0.0420g. CaO

With these solutions, 1 ml of the permanganate is equivalent to approximately 1.94 per cent CaO on a 0.100 gram sample.

Manganese Oxide

Procedure: Transfer 20 ml of the master solution to a 250 ml Erlenmeyer flask. Heat to boiling and add 20 ml of the acid mixture. Let boil for about a minute then add 60 ml water followed by 20 ml ammonium persulfate. Wait for solution to turn red and just begin to boil but *do not boil.* Remove from hot plate and allow to cool slowly for about 5-10 minutes, then cool below 30 C in running water.

Titrate rapidly with sodium arsenite solution to an orange color, then continue drop-wise to a clear yellow end point that does not change with further addition of the arsenite.

Calculation: Carry a standard sample with approximately the same manganese content as the unknown sample through this same procedure.

$$\frac{\text{Titration of std.}}{\%\ \text{Mn in std.}} = \frac{\text{titration of sample}}{\%\ \text{Mn in sample}}$$

Iron Oxide

Procedure: Transfer the remaining 60 ml of master solution to a 300 ml Erlenmeyer flask. Add 10 ml HC1 and heat to about 80 C. Add stannous chloride drop-wise until the solution changes from clear yellow to a clear white. Then add one drop in excess. Remove from hot plate, dilute to 150 ml and cool in running water. Add 10 ml of saturated Hg Cl_2 solution and mix gently. Wait one minute. Follow with 10 ml sulfuric-phosphoric acid mixture and 3 drops of indicator solution. Titrate with potassium dichromate until one drop causes a bright purple color that will persist for several minutes.

Calculation: One ml of the potassium dichromate will be approximately equal to 1.0 per cent FeO on a 0.3 gm sample. The solution should be standardized with iron wire by dissolving a 0.1 gm sample with 10 ml HC1 and then treating exactly as the 60 ml of master solution. This will give the Fe equivalent of 1.0 ml of the dichromate. Multiply the Fe equivalent by 1.28 to obtain the FeO equivalent of one ml.

$$\%\ \text{FeO} = \frac{\text{ml } K_2Cr_2O_7 \times \text{FeO equivalent} \times 100}{\text{Wt. Sample}}$$

Note: The standard $KMnO_4$ solution used for chromium or CaO may also be used to titrate iron, and no indicator will be required. This solution will have to be standardized for FeO as in the $K_2Cr_2O_7$.

Phosphorous, Chromium, and Magnesium

The oxides of phosphorous, chromium and magnesium can also be determined if desired by slightly modifying the basic treatment. It will be necessary to weigh a 1.0 gm sample of the slag, and at the same time to double the amount of boric acid and to increase the perchloric acid to 35 ml. The filtrate should be collected in a 200 ml volumetric flask.

Phosphorous Pentoxide

The P_2O_5 is determined by transferring 10 ml of the master solution to a 100 ml pyrex volumetric flask. Continue exactly as in the determination of phosphorous in "A Complete Chemical Analysis in 45 Minutes," Modern Castings, page 87, April, 1956. This sample for slag is only half as much as for the steel analysis, so after calculating in the usual manner, the answer should be doubled for the percent phosphorous in the slag. To convert to P_2O_5, multiply by 2.29.

Chromium Sesquioxide

Transfer 40 ml of the master solution to a 500 ml Soxhlet flask. Continue exactly as in the chromium determination in "A Complete Chemical Analysis in 45 Minutes," Modern Castings, first column, page 88, April, 1956. This sample for chromium in slag is equivalent to 0.4 gm.

To convert per cent chromium to per cent Cr_2O_3, multiply by 1.46.

Magnesium Oxide

Transfer 40 ml of the master solution to a 250 ml Erlenmeyer flask. Add 5 ml HC1. Dilute to about 150 ml. Add 10 ml of 10 per cent diammonium hydrogen phosphate followed by 10 drops of methyl orange indicator. Cool in ice bath, then add ammonium hydroxide drop-wise until the indicator changes color. Add 5 ml in excess. Allow to stand overnight, then cool in ice bath and filter. Wash the precipitate about six times with 10 ml portions of 5 per cent ammonium hydroxide. Transfer the paper and precipitate to a previously ignited and weighed porcelain crucible. Char the paper off at low temperature, then heat to about 1400 F in a muffle furnace for 1 hour. Cool and weigh the precipitate ($Mg_2P_2O_7$).

$$\%\ \text{MgO} = \frac{\text{(Wt. Precipitate) (36)}}{\text{Wt. Sample}}$$

An alternate method that may be used is to precipitate the magnesium using 8–hydroxy-quinoline with subsequent titration by standard bromate solution and thiosulphate. This method is described fully in "Develop Chemical Methods for Faster Sand Analysis" by R. A. Willey and J. B. Caine in American Foundryman, (Modern Castings) July, 1948, pp. 50-56. Reserve the filtrate from the calcium oxalate precipitation, and begin with "Neutralize solution with ammonium hydroxide" in the last paragraph on page 55 of the above article.

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HOW TO IMPROVE FOUNDRY LAYOUT

Most plants expand haphazardly, but here's a sound plan to make them genuinely efficient

■ Few foundries have been fortunate enough to start with a well-planned layout. Most have grown and expanded through the years with no comprehensive overall layout plan. The inevitable results have been high labor requirements, poor handling practices and excessive costs of operations in general.

Nevertheless, good layout is possible and it can offer tremendous savings in time and money. Foundries recognize that layout affects the cost of everything used or handled in making a casting. It affects the efficiency of workers and the productivity of machines. This special analysis describes and illustrates the stages of layout analysis and the steps toward improving layout. It will answer many questions that all foundrymen have always wanted to ask.

A MODERN CASTINGS BONUS

This is the 18th in a monthly series presented by MODERN CASTINGS to analyze important problems confronting the castings industry. A limited number of these reprints is available for 50¢ each.

FOUR BENEFITS OF GOOD LAYOUT

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■ This 12-page special report represents the synthesis of 10 years of foundry management engineering experience by the author. He is an industrial engineer and a graduate mechanical engineer who joined the Meehanite Metals Corporation in 1952. He has been head of the management engineering division since 1954.

Foundries must look to good layout for four major reasons:

1. To reduce labor requirements to a minimum and speed productivity.
2. To keep material handling costs to a minimum and promote good housekeeping, order and cleanliness.
3. To keep operations flexible.
4. To keep operations economical with expansion and growth.

Labor costs. The greatest asset of good foundry layout is the reduction of labor costs. Good layout, through economy of motion and handling, keeps labor requirements to a minimum. It eliminates the many delays and wastes of time and effort which can always be found in foundry operations. It permits every man to work more productively for more of his time. It lowers final product cost.

Materials handling. Another asset of well planned foundry layout is the reduction of material and product handling. In the foundry industry, where from 100 to 300 tons of materials and equipment may be handled in the manufacture of one ton of castings, the economies in handling are almost unlimited. Good layout ensures minimum travel between operations, both in distance and frequency of handling. It ensures the flow of materials and product in the right direction, thus eliminating most of the multiple handling and back tracking.

Flexibility in operation is yet another important factor in good foundry layout. We all know that layout is never a static affair. A good layout today may be outmoded tomorrow if tomorrow the type of castings or methods of production change. The planning of good layout will ensure that flexibility is maintained and with it an assurance of reasonable profits irrespective of product or methods change.

Economy. Finally, economy in operations must be maintained when expanding production and plant capacity. Only a careful study of the layout in all sections of the foundry will ensure a balanced expansion and a good return on the invested capital. Too often local changes are planned which upset the layout picture of the foundry as a whole. Increasing production needs can only be met through planned layout changes in all phases of foundry operations.

HOW TO START

All layout, whether the overall arrangement of a foundry, the study of one department, the study of a single work station or of an individual operation hinges on two factors:

1. The flow of material and product through the section under study.
2. The order of all items within the sections under study.

Flow. The study of flow produces the best arrangement of men, machines, material and equipment, to carry out operations in their correct sequence without delay or interruptions.

Order maintains good flow when production is in process.

Both items are essential. You cannot maintain good flow unless order exists and it is difficult to maintain order unless the flow of materials and equipment is right.

With that concept in mind, the most efficient layout would be a production line set-up, with materials entering at one end, moving through each operation until the finished casting emerges from the shipping room. (See Fig 1.)

This is true "line-production" which is rarely possible in foundry layout, even for foundries with large quantities of similar castings to make. At its best, good layout is a compromise between what is theoretically correct and what is practical and economical.

Foundry layout is mainly layout by process. This means that part operations are completed in departments and the work transferred in various stages of completion from one process to the next.

In the making of a casting, a definite sequence of operations is followed. This sequence should be incorporated into the physical arrangement of buildings.

Beginning with:

- Flask preparation,
- Setting of the pattern,
- Ramming of the mold,
- Finishing, drying and closing of the mold,
- Pouring off,
- Shakeout,
- Cleaning, chipping, grinding
- and finally—Shipment of the castings, these operations

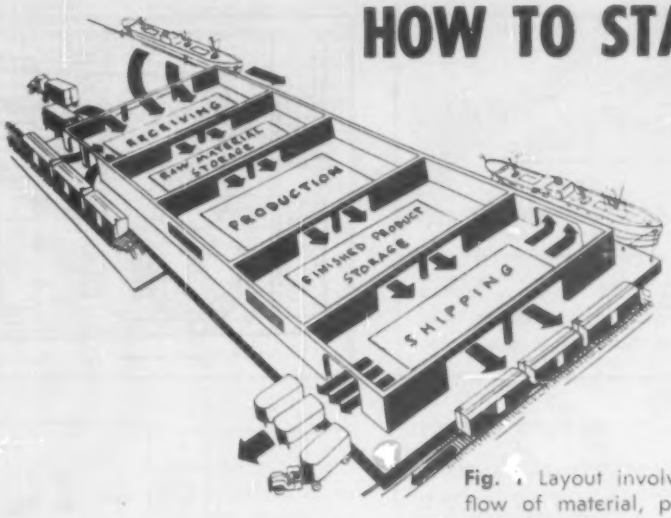


Fig. 1 Layout involves the flow of material, products and the order of all items.

should remain in line wherever possible. All other operations are service.

Service operations—such as the making and finishing of cores, the melting and tapping, the supply of sand, etc.—should enter the line of manufacture at the right point and at the right time.

There are of course, variations in production sequence between the various types of foundries. A mechanized production plant will differ in its basic layout from a non-mechanized jobbing foundry and very often the physical arrangement of existing buildings will change the flow picture from foundry to foundry.

Whatever the physical building arrangements or the type of foundry may be, the sequence of production should be considered in the arrangement of the overall layout. (See Fig 2)

With this basic principle in mind, you are ready to start a plan for better foundry layout.

For the first step in the overall layout study you need a plan of your foundry site which must show building outlines, railroad spurs, all permanent and temporary installations such as steelwork, foundations, walls, partitions, underground tanks, pits, etc.

Over this general layout, superimpose your flow lines. Differentiate between product flow, material flow and production equipment.

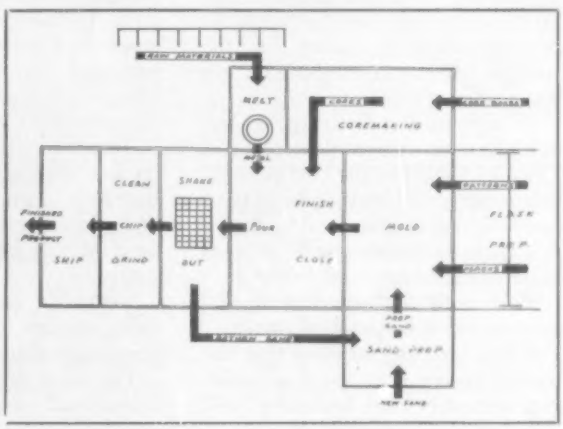


Fig. 2 Production sequence is vital factor in any plan for foundry layout.

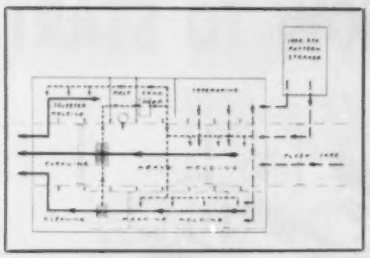


Fig. 3 First step in layout involves a flow diagram with no attention paid to details.

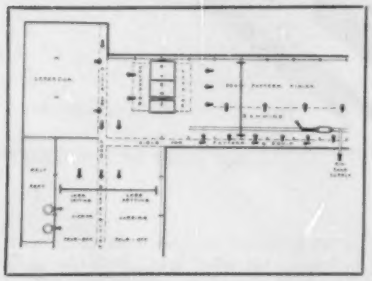


Fig. 4 Second step is the imposing of flow lines on existing plant facilities.

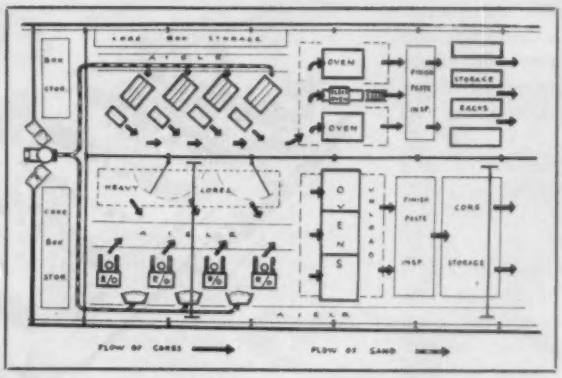


Fig. 5 Rigidity must be avoided, leaving room for changes.

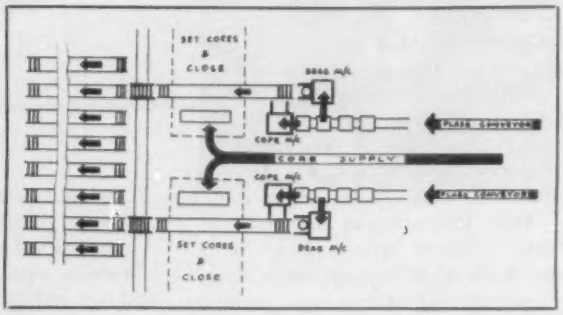


Fig. 6 Plan the processes around the product, its size and volume.

Indicate, wherever possible, the complete cycle of flow, from the moment a material enters production to the time it returns to storage, disposal or shipment.

Fig 3 is a typical illustration of such a flow diagram, which covers the overall foundry operations only, without attention to detail.

Now examine the purpose of each operation. Study the routing of materials into and out of each department. Can you reduce handling distance by relocation of departments? Are the physical arrangements of buildings or departments best suited for the purpose? Can you combine certain sections or similar operations?

To sum up the first stage of layout planning, review your plant as a whole. Establish the best possible relationship of production departments to each other and set up a flow pattern within the limitations of your buildings and budget.

Start with a theoretical ideal—tone it down to practical limits.

When you are satisfied that the overall layout is as good as buildings and structural limitations will permit, turn your attention to study individual departments.

Section study. This is the second phase of layout study and improvement. It deals with the perfection of the individual departments which make up a foundry.

It starts, as before, with a study of your present departmental layout. Prepare a layout of each department and show the present location of machines, ovens, conveyors, racks, cranes, etc. Be sure to include everything on this plan that can normally be found on your floor. If there is a waste of floor space in a certain area of one department show it on your plan. Don't deceive yourself at this stage, illustrate your layout as it really is.

Then superimpose your flow lines. Differentiate again between materials, equipment and product and show the routing of all items used in the operation of the department.

Develop your questioning attitude towards all phases of your present operations.

The same principles of flow and operational sequence will determine the best arrangement of machines, the location of ovens and other fixed equipment, the flow for materials and positioning of men.

The study of the functions of the department determines the equipment to be used, the capacities of cranes, the types and size of material handling equipment and the choice and position of other production tools.

It is very important at this stage to avoid rigidity. All departments should remain flexible, prepared to meet changes in product and quantities. All physical arrangements should be laid out with a view to expansion or further mechanization.

This can best be described by several illustrations which show how the principles of good and direct flow are maintained in the study of individual departments.

Fig 4 illustrates a heavy floor molding area.

It indicates correct flow from ramming to pattern draw and finishing; the handling of molds through loading, drying and unloading stages at the mold oven; the final setting out of dried molds

in the pour off area, ready for close-up. Note the correct positioning of the coreroom and the adequate service facilities and aisles, both in the handling of cores and in the distribution of patterns and equipment. A particularly good feature is the close proximity of the cupolas to the pour off area, reducing metal handling to a minimum.

Another layout study, showing the flow through a coreroom is illustrated in Fig 5.

It shows a good arrangement for core sand storage and muller. It indicates lines of sand distribution to various coremaking sections. Note that the sequence of production, from coremaking to drying, finishing, pasting, inspection and storage has been maintained for bench, heavy and machine cores, which are all made in this coreroom. Close proximity between all operations reduces handling to a minimum.

Yet another layout, the study of a machine molding section, is illustrated in Fig 6.

The routing of flasks directly to the two sets of machines and the handling of cores to the close-up stations is noteworthy. Handling of the final mold via transfer cars to pour-off conveyors illustrates good and inexpensive handling with a minimum of labor.

The cover illustrates how Caterpillar Tractor Company laid out its core room to facilitate the flow of cores from blowers and benches to drying oven.

Summing up the second stage of layout improvement:

- Review each department separately.
- Plan the departmental processes around the product—considering its size and anticipated volume.
- Establish the best suitable production equipment.
- When process and machinery are established, consider services, handling facilities and other production requirements.
- Maintain wherever possible operational sequence and direct flow.

Again begin with the theoretical ideal, then trim it to the limits of practicability and your budget.

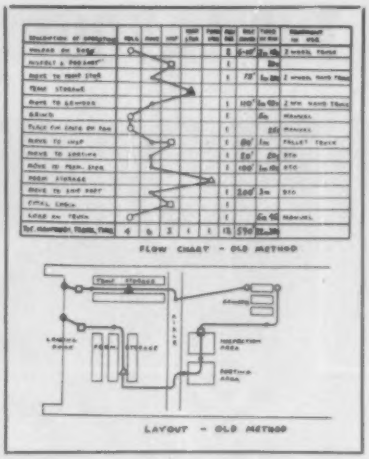


Fig. 7 Former layout shows more steps in operation and use of hand, pallet trucks.

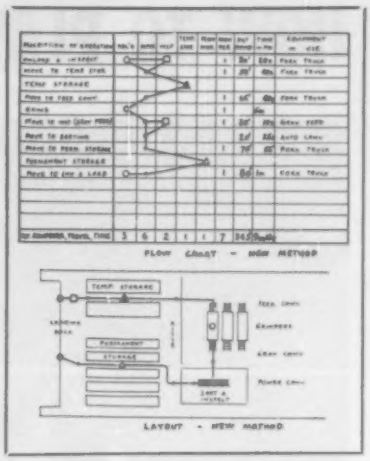


Fig. 8 Straight line flow and employing lift trucks, conveyors cuts time cycle.

When the departmental study is completed, turn to the final stage of layout planning. This is the study and improvement of individual operations or work stations within each department.

This stage is more limited in its scope. It aims for improvement of individual tasks by provision of easy access to each station, by planning for economy of movements in the performance of operations, by providing the best possible handling aids.

The execution of this final stage can differ widely. A great deal can be done by observation alone. Watch an operation through several cycles. Note the delays, inefficiencies or bottlenecks. Appraise critically the available handling aids and other tools. Study carefully the positions of individual operators and the ease of their movements.

Where industrial engineering aid is available, flow process charts, machine-operator charts and other detailed studies can provide indications of better methods.

Such a study—in this case the investigation of a grinding operation in a cleaning room—can yield substantial savings, as illustrated in Figs 7 and 8. Fig 7 shows the layout and flow process chart of the old arrangement. Fig 8 illustrates the improved layout and method of production.

The improvement shows the following savings:

- Manpower reduced from 13 to 7 men.
- Total distance travelled reduced from 590 ft to 345 ft.
- Number of operations reduced from 15 to 13.
- Total time cycle reduced from approx. 22 min. to approx. 9 min.

Each station, each machine or even each individual operation can be studied and analyzed in this manner. The object is improved work station layout to obtain maximum productivity.

To sum up the final stage—give attention to detail. Study each part of a department with the object of isolating the little inefficiencies and delays which, when added together, consume such a large part of an operating cycle. Whether by observation or detailed study, individual efficiency depends on the effectiveness of this stage of layout improvement.

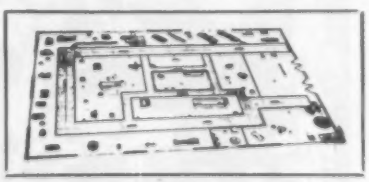
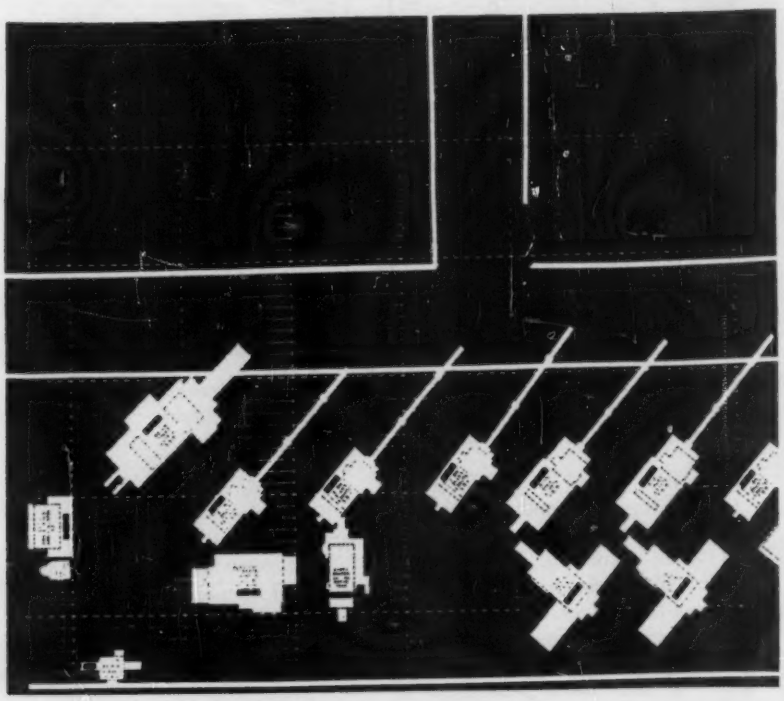


Fig. 9 Template planning puts realism in the layout.

HOW TO PLAN THE LAYOUT



WRONG

Fig. 10 Omission of equipment defeats purpose of templates.

The complexities which have entered our industry in recent years in the form of more complicated machinery and equipment, the use of more and bigger handling equipment and the trend towards more mechanization and even automation have made planning for greater production a complex affair.

Planning today has become a combined operation. It takes technical as well as non-technical men to combine their thoughts and reach agreement on better layout; to get not only a technically perfect but also a financially sound operation.

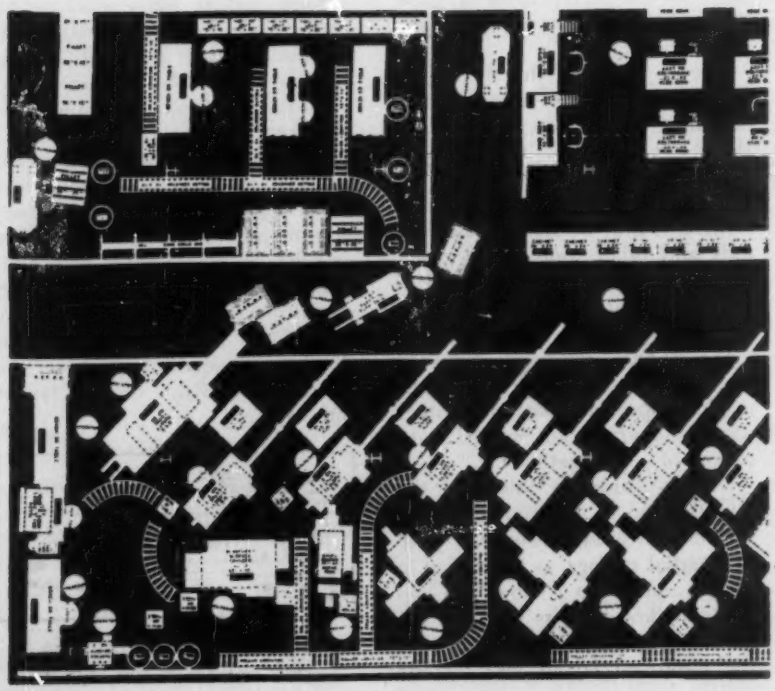
This is where template planning and 3-dimensional models can be invaluable.

Templates are widely used and self-explanatory in application. You place cut-outs of equipment and machines on a floor plan of the department under investigation. This is shown in Fig 9.

Be sure to avoid one pitfall when using templates! You must include in your plan everything that is actually in use on the floor, not just major equipment and machines and partitions as shown in Fig 10 but also conveyors, work benches, boxes, buckets, racks, and the usual assortment of tools required in normal process, as shown in Fig 11.

Remember in template planning to include in your layout everything that is used by the men in the shop in performing their duties.

But even template planning is often inadequate because the space above the floor has become a ma-



RIGHT

Fig. 11 Attention to detail results in accurate layouts.

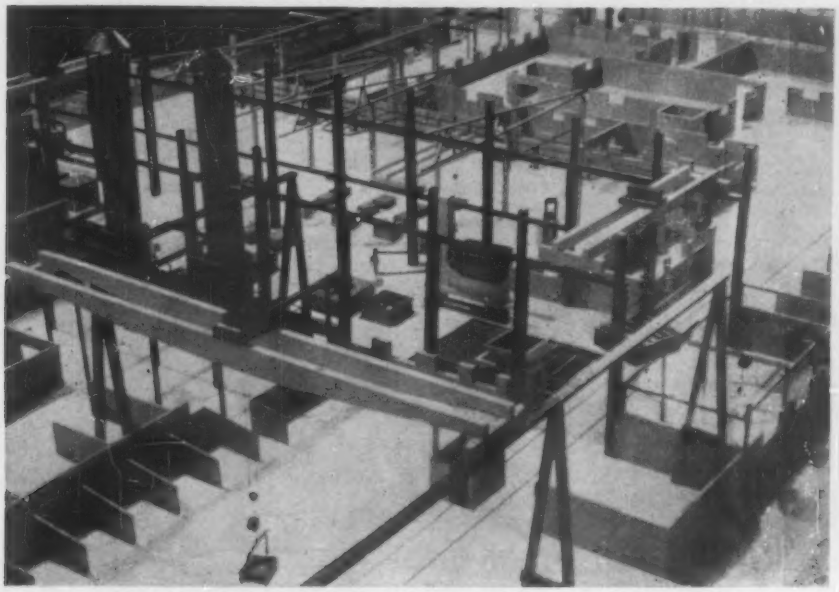


Fig. 12 Three-dimensional models will easily pay for their higher costs through a more accurate plant view.

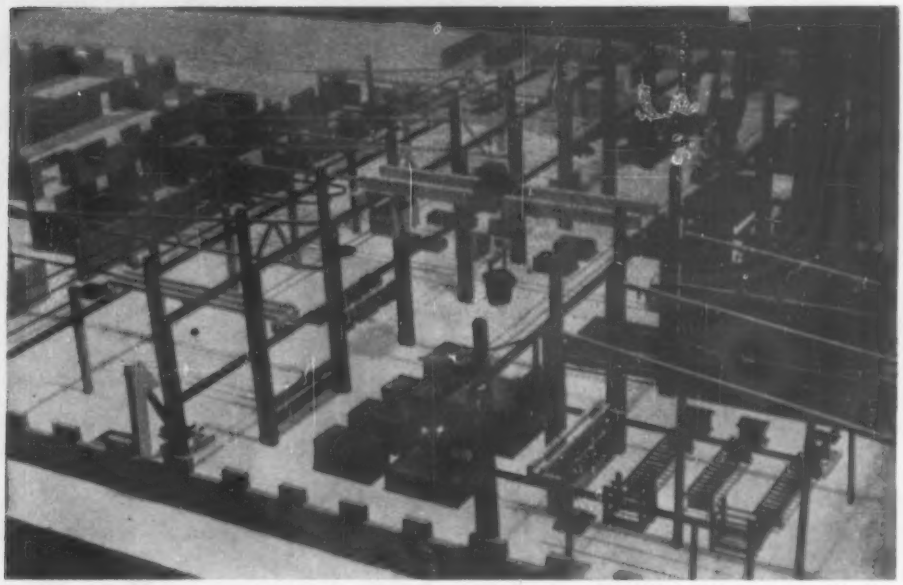


Fig. 13 Bottlenecks are spotted quickly when each detail is shown as it exists.

jor consideration, particularly in material handling and storage.

Planning today must consider cubage or 3-dimensional space. The advantages of layout planning with models instead of templates are so outstanding that they easily compensate for the higher cost.

Three-dimensional planning is more flexible. It is a simple task to create alternate plans. Advantages or bottlenecks are quickly recognizable. It makes the project easily understood, particularly by the non-technical members of the planning team. It reduces planning errors such as structural interference or inadequate clearance. Such errors are frequent and very costly to correct.

Three-dimensional models can also be used in foreman and personnel training. It is easy to demonstrate new functions and changes in methods. Better understanding of all departments and operations gives the men in the shop a better chance to cooperate in making the new plan work right.

For anyone starting a layout improvement program today, the 3-dimensional model is the best possible beginning.

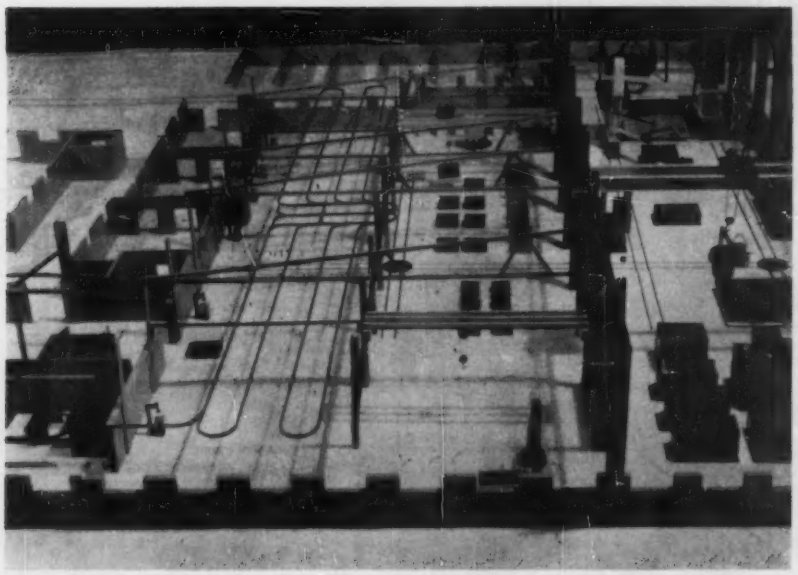


Fig. 14 Utilities, handling equipment must be considered when undertaking any changes in the layout of the plant.

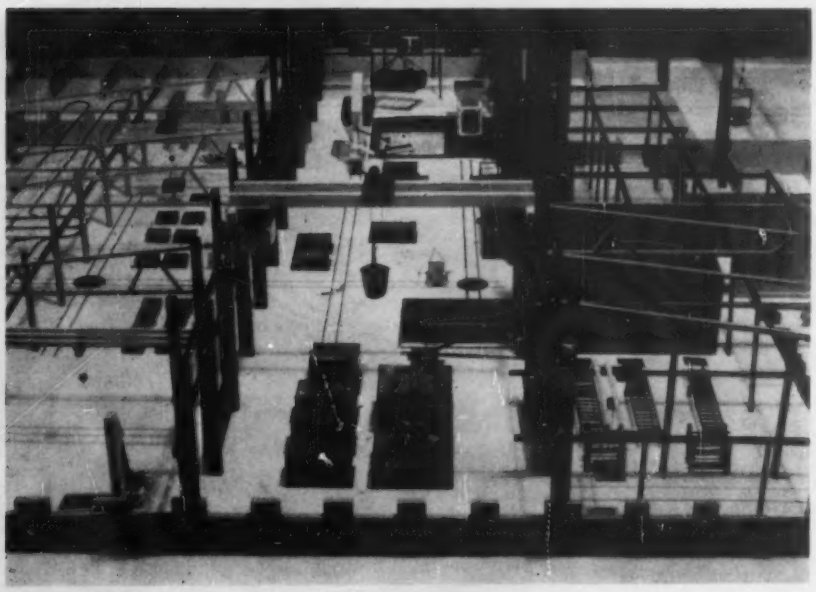


Fig. 15 Good layouts allow non-technical staff members to understand the problems involved in each department.

Figs 12 to 15 illustrate several views of a 3-dimensional model of an old jobbing foundry. With the help of 3-dimensional planning this foundry has done an outstanding job in improving production facilities, reduction of material handling and lowering of manufacturing costs.

In addition to the methods of layout planning, some important hints and pointers of "do's and don'ts" are given in the following paragraphs.

If your plans include new buildings, be sure to allow for possible expansion or future changes in product and process.

Think about services and utilities required by production or handling equipment. Investigate the economies of grouping.

Don't forget the maintenance engineer. Give him adequate access to all equipment and machinery above as well as below the ground.

Make your planning a combined operation. Everybody connected with the running of a department should contribute his ideas or requirements. Only in this manner can all sides of a problem be fully understood and considered.

HOW TO APPLY THE PLAN

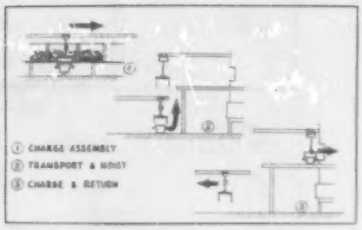


Fig. 16 Combining charging and charge make-up result in new installation paying for itself within just one year.

Efficient use of space gives compact and orderly layout to molding floor at Cutler Hammer foundry operations.

In the following pages several interesting applications of layout planning are described and illustrated. Some of them contain "before and after" illustrations which indicate clearly the outstanding improvements which can be obtained by following the principles of sound planning of foundry layout.

The first application comes from a foundry yard and deals with charge make-up and charging operations. This foundry wanted to retain hand charging but planned to reduce the approximate 32 man-hours per day required for an average 20-ton heat production.

Following a study of the sequence of charge make-up and charging, a simple procedure was devised combining the operations.

This procedure, illustrated in Fig 16, shows schematically the procedure now followed. Charge

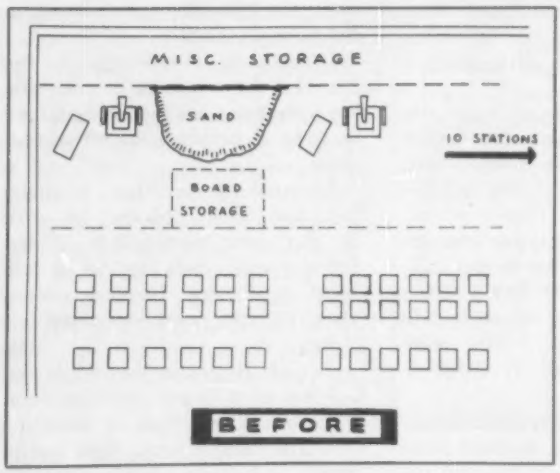


Fig. 17 Typical arrangement of non-mechanized squeezer floor shows inefficient use of space.

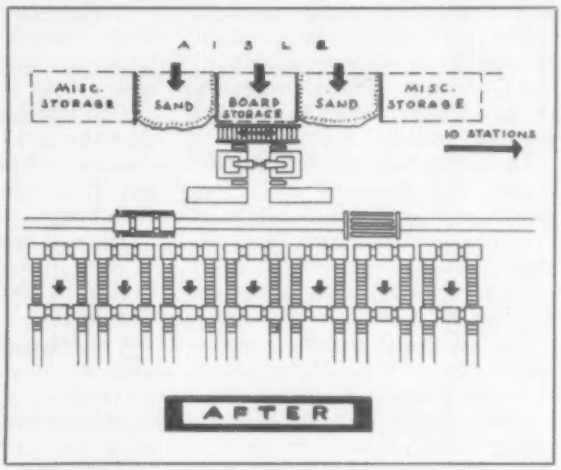


Fig. 18 Operations have been improved by cutting excessive time losses in sand and mold handling.

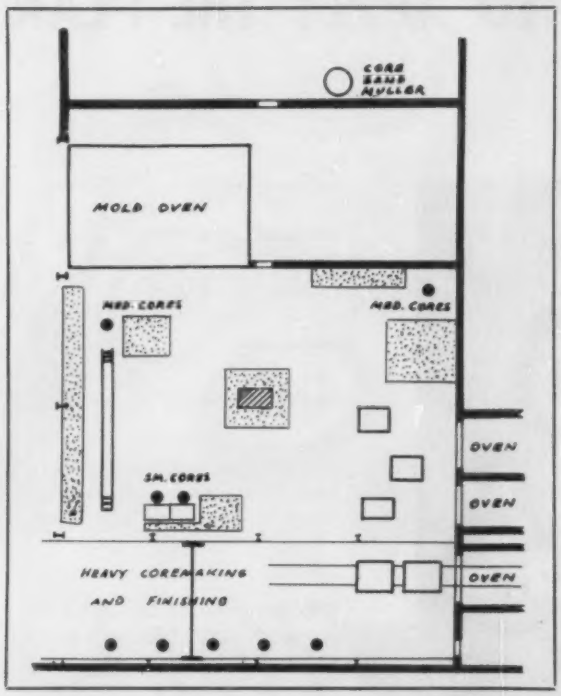


Fig. 19 Previous core room layout suffered from limited access and available work space.

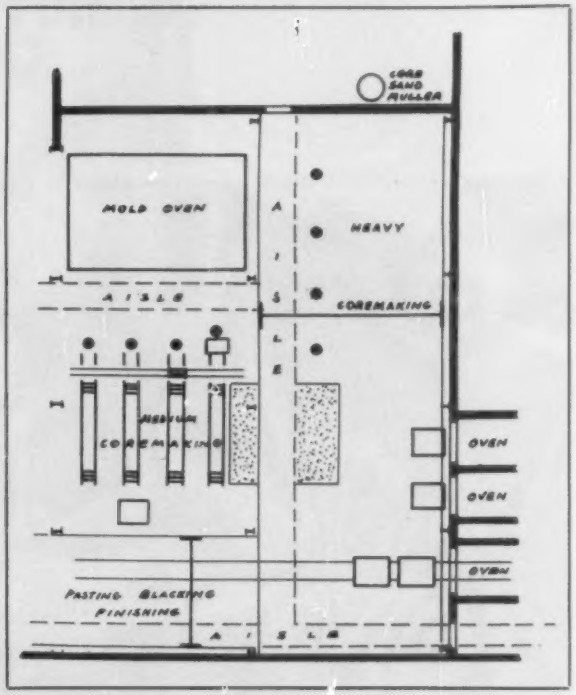


Fig. 20 Installing handling equipment and relocating bins has streamlined operations.

components are raked from elevated bins into charge boxes suspended from a scale. The box travels to the cupola platform on a monorail where it is hoisted and positioned in front of the cupola, ready for charging.

The cost of this installation was recovered in approximately one year from labor savings alone.

The next installation describes changes in a squeezer operation. Fig 17 shows a typical arrangement of a squeezer floor, completely non-mechanized.

Layout studies revealed the excessive time losses in mold and sand handling. Although overhead sand supply would have been desirable, it was decided to concentrate as a first step on mold and equipment handling. (Fig 18).

On previous page note compact efficient layout of this molding floor at Cutler Hammer Foundries, Milwaukee. Molds are stacked on rolling bottom boards. At right is mold shakeout onto magnetic belt feeder supplying elevator. Sand is dumped through vibrator screen into bin from where it is conveyed to a revivifier (right rear) and then returned to a point between the two molders. Also note the simple mold conveying technique being used.

Fig 19 shows the changes in layout which, apart from relocation and bins provided good access to all stations and reduced mold handling through the use of roller tracks and transfer cars in another case.

This foundry enjoyed high productivity even before the layout changes, but further boosted output of individual squeezer molders from 10 to 15 per cent.

The next example shows changes of methods and layout in the making of medium and heavy cores The original layout, illustrated in Fig 20, restricted to a bare minimum the work area available to coremakers.

Much of the floor space was taken up by core boxes, finished cores and miscellaneous storage and the resulting handling difficulties became costlier with increasing production from this area.

A revision of the layout is shown in Fig 20. This improvement included a larger heavy coremaking area, the provision of service aisles for sand and core box distribution, the use of roller tracks for temporary storage of medium sized cores and the installation of a small roll-over machine for coremaking in the medium range.

Particularly noteworthy is the fact that the sequence of coremaking operations has been maintained in spite of building layout restrictions.

Coremaking time has, in many instances, been reduced by over 50 per cent particularly in the heavy range, while the use of roll-over equipment boosted output over 100 per cent on repetitive items.

Fig 21 illustrates the old layout of part of a heavy molding floor. This was a problem of handling and distributing cores, flask equipment and patterns. Considerable difficulties were encountered in finding adequate crane service.

Fig. 21 Inefficient use of crane and service aisles led to excessive delays in heavy molding department.

Through a change in layout and provision of adequate service aisles, many of the handling problems were satisfactorily solved. Crane delays were almost completely eliminated and delays in production, which frequently exceeded 20 per cent of a man's time, were reduced to acceptable limits.

The improved layout shown in Fig 22 did not involve any capital expenditure and boosted individual output by more than 25 per cent in many cases.

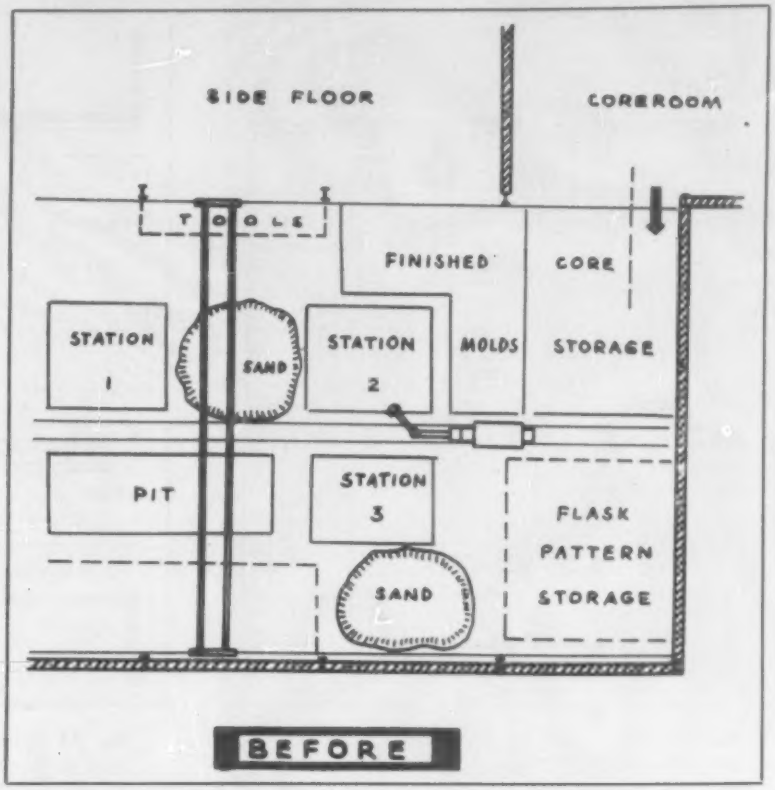
In the next example, a similar condition of excessive delays in the operation of a cleaning room could be attributed to a poor layout, which is illustrated in Fig 23.

The rearrangement of the work areas was carried out to provide a step-by-step processing of castings of heavy, medium and light weight. The sequence of operations was maintained in the layout of the equipment, thus reducing to a minimum the handling requirements during and between processes.

The revised layout which is shown in Fig 24 also illustrates the service aisles which were important to keep the product on the move once the process had started. Other improvements include the relocation of the tumbling blast barrel, the installation of a continuous sorting belt and a small overhead crane.

Capital expenditures were small and paid for in less than a year by labor savings and overtime reduction.

Fig 25 is another core room installation, of particular interest in view of the good flow features for both large and small cores. The flow lines on this illustration show again the incorporation of operating sequence into the layout.



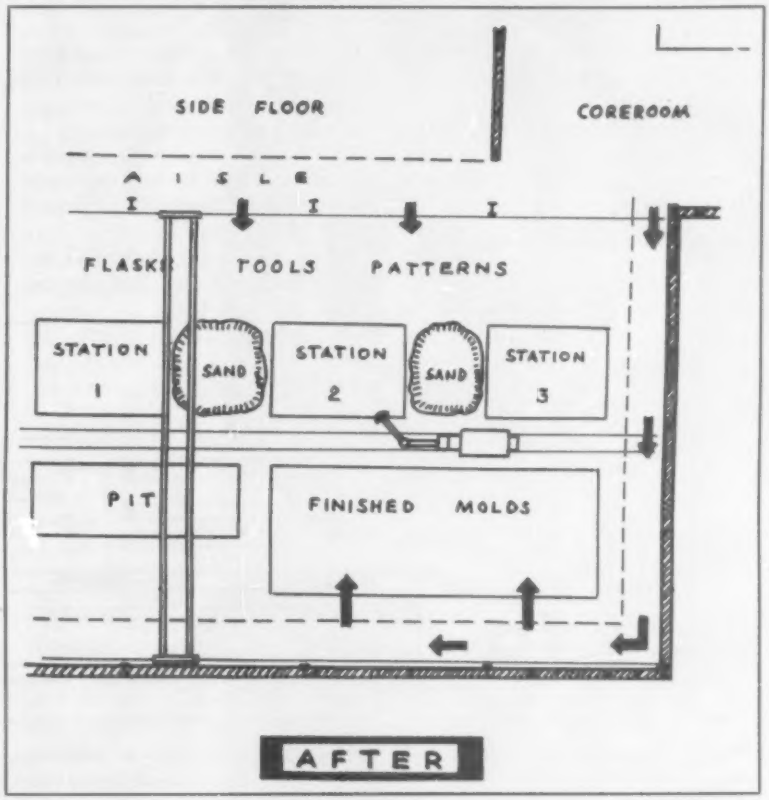


Fig. 22 Individual output was increased without cash outlay by making efficient use of existing facilities.

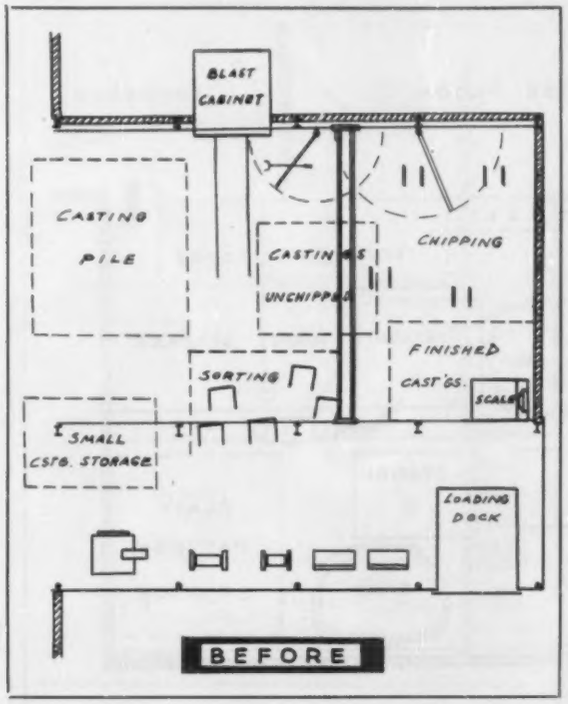


Fig. 23 Poor layout of floor space resulted in excessive production costs in the cleaning room.

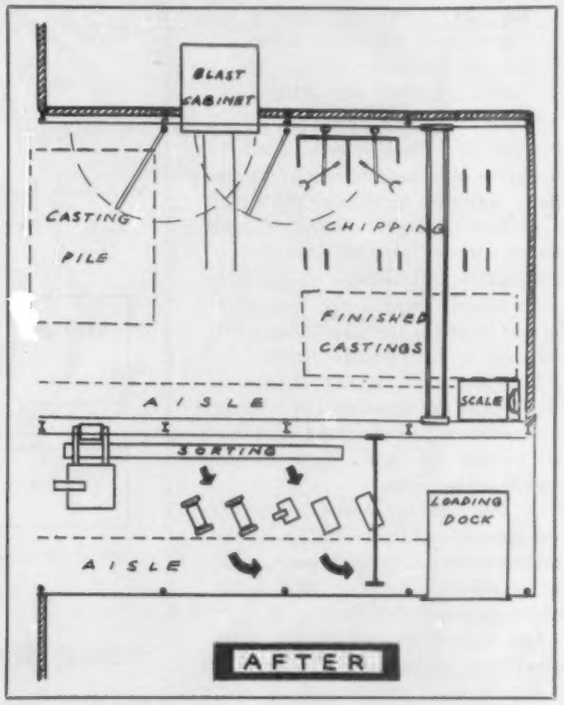


Fig. 24 Better use of service aisles kept the product in motion once processing had started.

One particular feature of interest in this layout is the large core oven, which by its location and provision with doors at either end can be used to serve the core room during the day and the foundry during the night.

Fig 26 is yet another illustration of a well planned cope and drag bumper set-up, to work in conjunction with a roll-over machine.

The flow lines for both materials and product indicate well the many advantages obtained from a layout of this kind.

All in all, layout study and improvement, such as that demonstrated here, has become an essential part of management's task in running a profitable foundry operation.

In addition to the efficiency gained by layout study, however, there must be included the continuous improvement of operating facilities in line with product changes and advancement in methods.

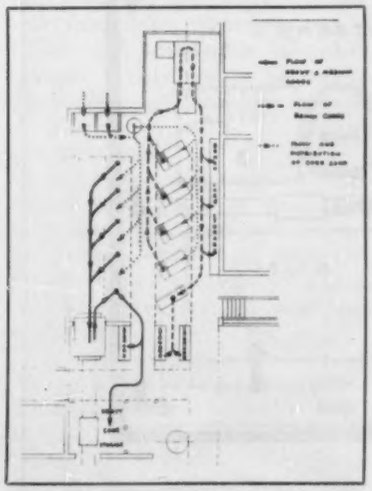


Fig. 25 Sequence and flow are needed for efficient operation.

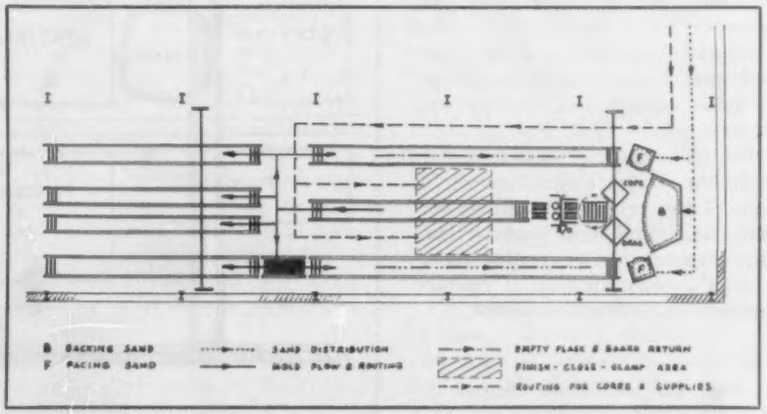


Fig. 26 Flow lines of materials and products in cope and drag bumper set up show advantages to be gained with planned layout.

Castings for Kids— by the Millions

Has Santa received his Christmas list from your kids? Does it include a toy car, truck or airplane? If that list includes a toy car, truck or airplane with a bright coat of paint and made from metal for a longer "play-life" chances are that it was made in Chicago by Dowst Mfg. Co.

Millions of toys—more cars than made in Detroit, more planes than turned out by all plane builders, and more buses than Greyhound ever saw—are cast yearly by the makers of Tootsietoys.

Now the largest manufacturer of cast metal toys in this country, Dowst started in 1876 as publisher of the *National Laundry Journal* and producer of collar buttons and laundry accessories. After seeing a new type-casting machine at the World's Columbian Exposition in 1893, a partner in the firm saw the possibilities of casting novelties from lead or type-metal. The first toys produced were trinkets for prizes in penny packages.

Dowst now employs 350 people in two shifts working in a 80,000 sq ft, one-story plant built for the company in 1954.

The toys produced range from semi-trailers and logging trucks to dream cars and jet planes. Most toys are sold from July through November but the plant operates at a steady pace the year around. Retail prices for the toys range from a dime to $3.00.

Dowst's facilities consist of eight standard hot chamber die casting machines and 12 smaller, high speed machines designed and built by the company. These smaller machines handle 750 shots of metal per hour as compared with 250 shots for the standard machines.

On the small, custom built machines, Dowst casts such items as road signs, ladders, badges and small components. Radio and television parts are also in production on these machines. Each casting may include six or more different parts attached to one gating system. Parts are broken from the gates by hand, eliminating the need for trimming dies.

Production is confined to a 97 Zn, 3 Al alloy which is cast at 800 to 850 F. Although there is a trend to plastic toys, Dowst has concentrated on durable, metal toys. As a result of the firm's ability to mass produce small rugged parts, it has also been able to increase its jobbing production.

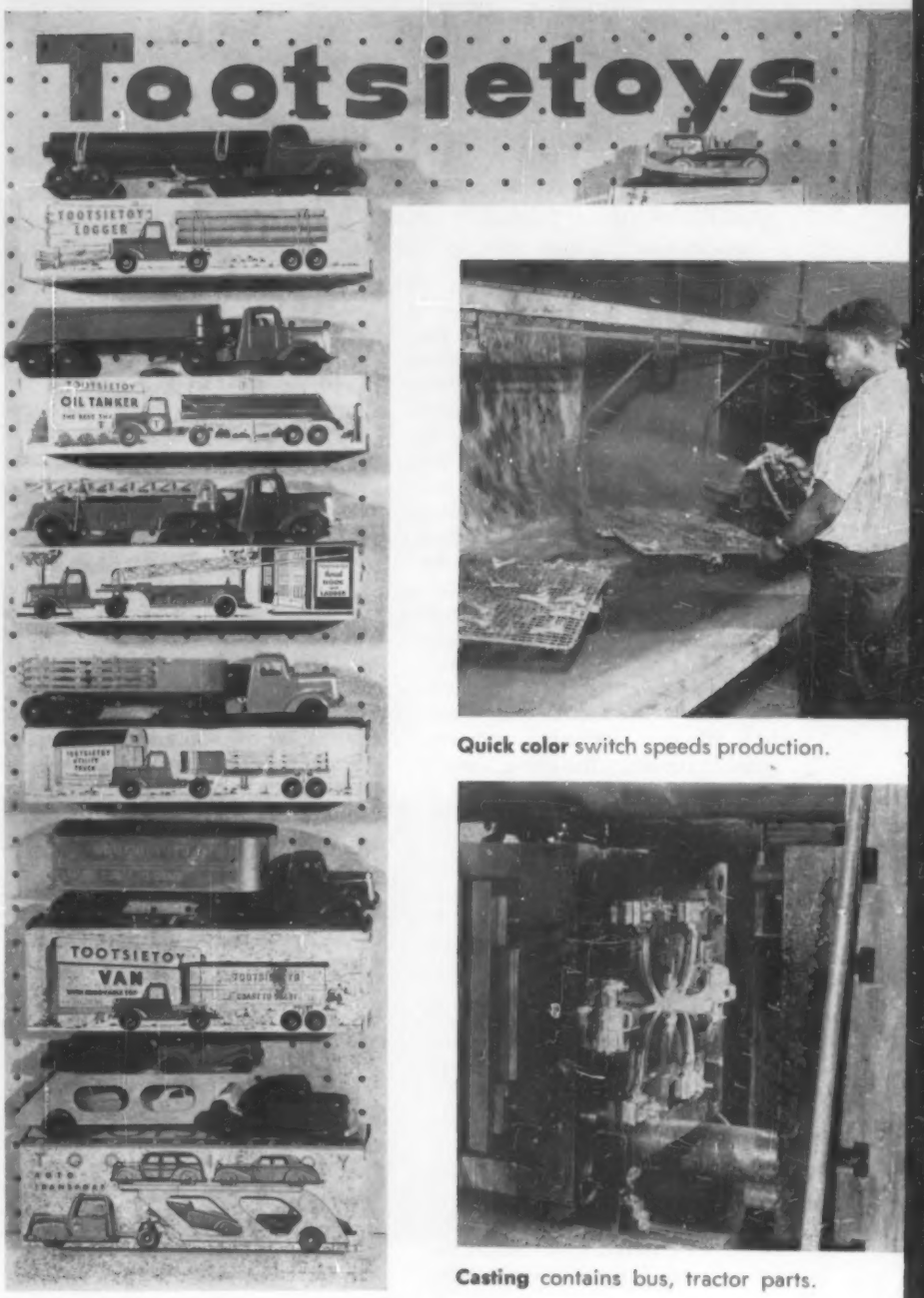
GEORGE A. MOTT /
Assistant Editor

After casting, toy parts are cleaned with equipment that includes three large barrel machines and five smaller ones. Various dry deburring, cleaning and polishing compounds are used in some operations while in others the parts are just tumbled together.

Design work on toys starts months ahead of production. Because of this, no attempt is made to copy current auto models. However, attention is paid to the trends and cars are constantly being redesigned. Other toys in the line are also changed but revisions are not a major problem in such items as tractors, trucks and trains. Frequently the complete line is reviewed and such items as doll furniture have been discontinued.

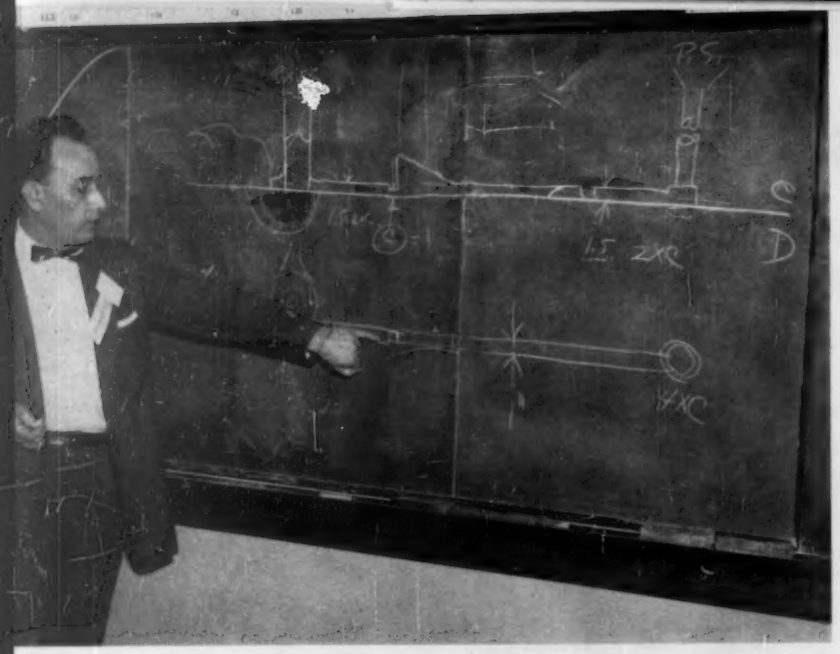
Toys get their bright coats of shining paint in two paint spray booths where a water screen is used to control and recover wasted paint. A unique feature of this operation is that six colors are always available to the painter. Colors are mixed at a central station and are piped to the operator. All paints are non-toxic.

An unusual situation exists in color selection. Because the rainbow hues now in vogue for Detroit-type autos look washed-out on the toys, Dowst favors a combination of bright red and green for its juvenile motorists. More than 50 per cent of the paint used is bright red. When three colors are needed to duplicate current auto styling, the predominant color is applied first and the toy is then placed in special masking features and the remaining colors are applied in a few seconds.



Quick color switch speeds production.

Casting contains bus, tractor parts.



Author Charles V. Knobeloch, foundry engineer, R. Lavin & Sons, Inc., determines the gate area as first step in planning of the system.

CHOKE THAT GATE

By using set ratios you can balance flow throughout the system

Many types of gating systems are in use. Some are good, some are mediocre, and some are bad. Here is a system that has given good results with copper-base alloys in machine made and hand rammed green sand molds.

Some comprehension of the flow of fluids through tubes and orifices is vital if the mold cavity is to be filled correctly. Perhaps the quantity of metal that can be delivered from varying sized orifices, or gate entries, is of first importance. If this is known, then we have one very important factor under control. We can determine with reasonable accuracy the filling time of the mold cavity. This aids us in flowing molten metals so that directional solidification can be enhanced by allowing heavy metal sections to cool or dissipate more heat before the cavity is completely filled. Then we can accommodate the pour to help the molding sand do its job.

The physical nature of the mold to be cast is usually a definite quantity in the equation. We know, for instance, that the mold is made of green sand, either naturally bonded or compounded to formula. The physical properties of the sand are within specific limitations. Or we may be casting in dry sand, such as cores or baked sand molds, and here we are dependent upon baked core oils, pitch, cement, and resins as bonding agents.

In the case of green sands, we must bear in mind that as the mold cavity is filled the sand which is not immediately contacted by the molten alloy is subject to radiant heat. Depending on the time of exposure to this radiant heat, the sand will lose a portion of its moisture by vaporization. This loss entails a small loss in green strength or bond, and if this loss is sufficient the sand is weakened to a point where it will wash or even break off when some of the sand sections are thin or feather edges exist. When this occurs, casting surfaces are defaced, and loose sand grains are generally scattered over the finish.

This type of difficulty is not usually encountered with the dry sand molds. They can generally stand even an abnormally long filling time that is sometimes caused by equipment failure or gross quantities of metal to be cast in a single mold cavity.

When filling green sand molds with brass and bronze alloys, and the section sizes to be cast are not excessively thin (say over an 1/8 in.) with casting weight under 300 lb, a filling time of 15 to 45 sec has been found quite satisfactory. This first of all fills the mold cavity at low flow velocities, producing minimum turbulence, hence no dross or oxides. Second, sand wash and mold break-offs are nonexistent or reduced to a negligible quantity, since fast moving heavy flooding action against thin sand walls cannot take place.

Third, cold shuts, laps and shot are eliminated. This is best visualized by considering the mold cavity to be a semi-porous pneumatic cylinder, and the incoming metal as a liquid piston. For the liquid metal to flow into and fill the mold cavity, it must displace all of the contained atmospheric air, plus all of the gases that are being generated by the action of heat in the liquid metal on the sand constituents. These gases exit through the risers and vents freely until they are shut off by the rising liquid level. The remaining pockets, generally in the cope, can only exhaust through the sand.

Herein lies one of the sources of trouble. Quite frequently the permeability of the sand is insufficient to carry off the compressed gases as rapidly as is required by the incoming liquid metal, so that liquid metal flow is retarded and gases and molten metal become intimately mixed. If the time during this condition is sufficient (and it often is), partial solidification takes place and the viscosity of the cooling metal is increased, trapping the mixed gas bubbles and allowing oxide films to form. This causes laps, creases, and spotty pinholing, which becomes apparent usually when the cast surface is removed by machining.

Fourth, the thermal shock induced in the molding sand is reduced by slower filling and any tendency for the sand to spall or crack off from this cause is retarded, thus reducing the occurrence of rat tailing or cracking.

There is a very simple way to

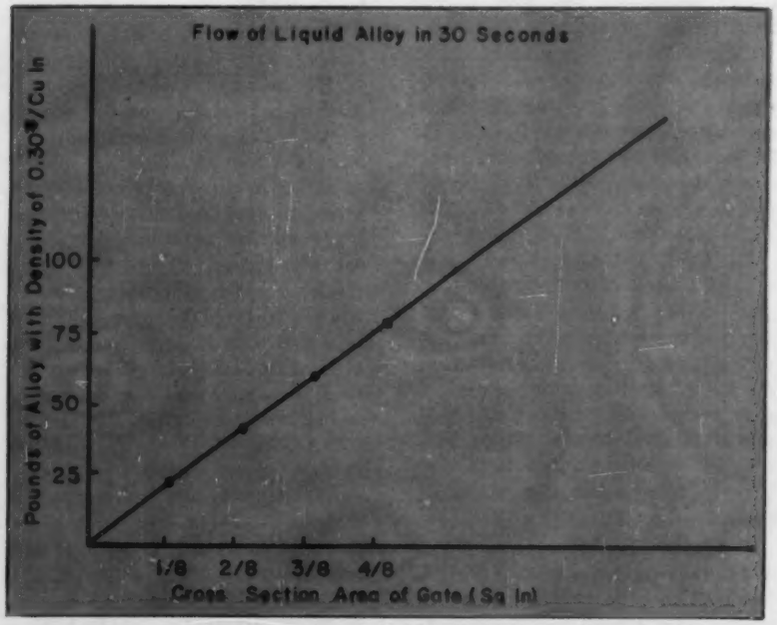


Fig. 1 . . Gate area is easily found by knowing weight to be poured.

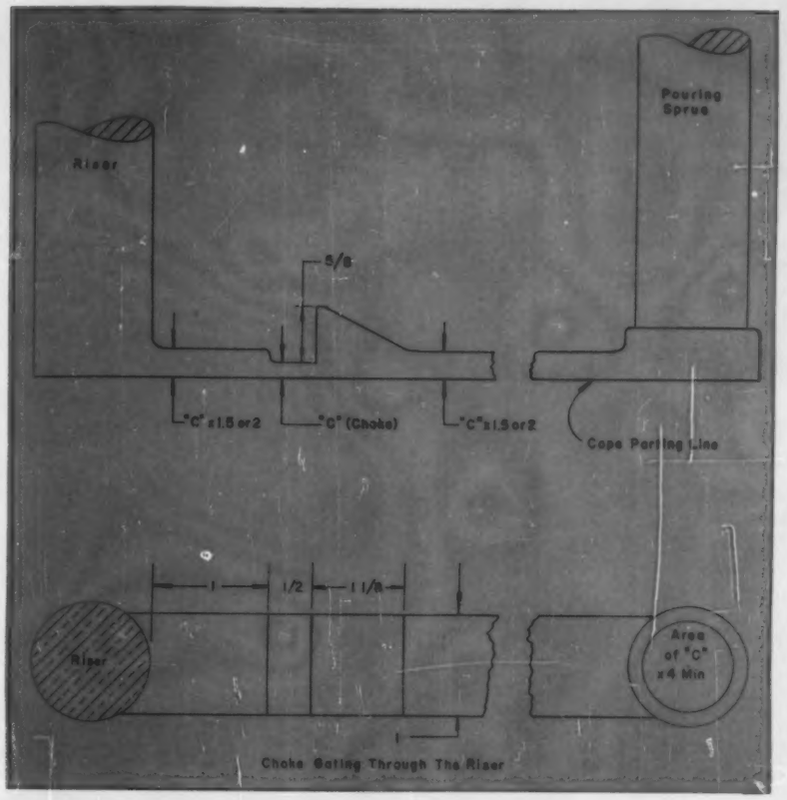


Fig. 2 . . Gating system should be as automatic in control functions as possible to eliminate variables found in pouring operations.

determine with reasonable degree of accuracy the gate area required to fill a mold cavity in a given period of time when the weight of metal to fill the mold cavity is known, since all the other factors are reasonably constant. Simply divide the weight to be poured in the mold (in pounds) by 25. This gives the number of 1/8 sq in. of gate area required for a 30-second filling (Fig. 1).

Knowing the total gate area required, we can plan the gating system. A gating system should be as automatic in its control functions as possible. Then it will give uniform filling from mold to mold and eliminate the variable that the pourer can introduce when he changes his pouring technique from flask to flask.

Since the flow of molten metal through a specific cross sectional area is relatively constant, this orifice, or choke, serves as a pouring control to produce the desirable qualities, provided it is supplied with sufficient molten metal, the pouring pressure or hydraulic head is reasonably constant, and facilities for collecting scavanged nonmetallics is provided. Fig. 2 shows the principles and proportions involved in a gating system that will do these things.

The choke at *C* is the focal point of the entire system of fluid metal flow. This is the calibrating orifice that controls the rate of flow as determined from the flow diagram. The balance of the gating system is simply a series of tubes designed to supply this orifice area with a sufficient or slight excess of alloy so that the choke will never run dry or be underfed. The proportions of the runner between the pouring sprue and the choke should be larger than the choke area, since it is the supply line from the pouring ladle to the controlled orifice area; so it must, of necessity, be larger in cross section than the choke.

A good ratio is, at least, 1-1/2 or 2 times the choke area. This assures the choke of a constant supply of metal, provided the pourer does not pour metal at a slower rate than the capacity of the choke. The projection above and directly before the choke is simply a small reservoir to enable metal and nonmetallics that first reach the choke to be skimmed out of the flow path. The runner area between the choke and the riser connection is larger than the choke area to reduce the velocity of the fluid metal before it reaches the casting. Therefore, the area of this runner will have to be larger than the choke area, and the same ratio of 1-1/2 to 2 times the choke area is generally sufficient.

This type of flow control can often be used to advantage when the horn type gate is required and the smaller diameter of the horn is under 5/8 in. in diameter. Normally when such a small diameter is encountered the hole remaining in the sand is usually damaged slightly and enlarged after the horn has been withdrawn. This rough edge is generally touched up by hand or a small molder's tool and inevitably the controlling orifice diameter ends up being much larger, closer to 3/4 of an in., so that the control of the flow of metal is not what is desired. If the small end of the horn is located just after the choke, then the diameter of the horn becomes non-critical, since the choke will take over the job of accurately controlling the flow of metal. When the small end of the horn gate is over 5/8 in. in diameter, this type of gating is generally not necessary since the horn alone will not be distorted enough to appreciably change the flow of metal through it.

It is important to note that the gate enters the riser. This makes the riser a live one and allows it to receive the hottest metal after the mold cavity is filled. In addition, the sand surrounding or forming the riser connection to the casting is heated more than the balance of the sand forming the mold cavity. A heat dam is then built up by the flowing metal, which, in turn, aids this smaller area connection to feed hot fluid metal from the riser to the mold, even though the sectional area of the casting is larger than the connection. Also of great importance is the location of the choke in relation to the riser. It should be as close to the riser as is practical, since it is the cleaning area. The metal should be clean just before it enters the riser and the mold cavity. Locating the choke too far away from the riser enables eroded sand to get into the mold cavity from the runner connecting the choke to the riser, and subsequently into the casting.

It is advisable to use small radii on all of the edges of the runner system and gate to avoid feather edging of the sand. The shape of the runner and choke is important,

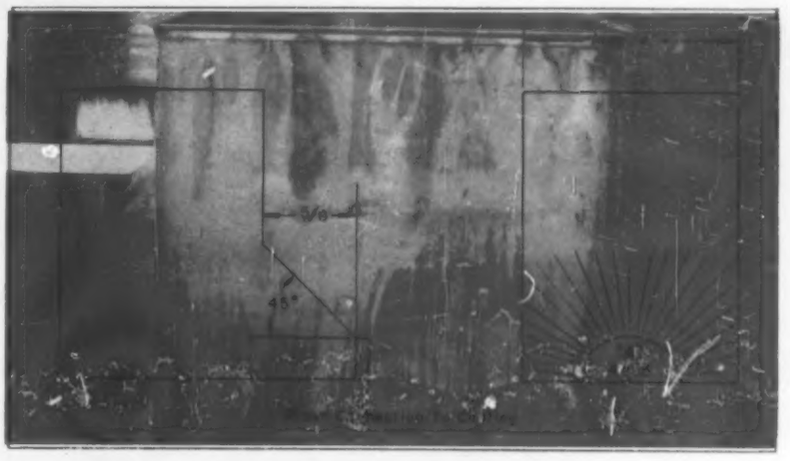


Fig. 3 . . Riser size is based on yield factor for particular alloy.

inasmuch as this system should float out as much nonmetallics as possible before entry into the riser and mold cavity. Hence, the gate is low and wide, allowing the greatest area for this flotation to take place.

The gating system is located in the cope of the mold, and the drag is relatively a flat back. This serves a useful purpose when the mold cavity is confined to the cope; it permits filling the mold from the bottom and reduces turbulence such as is produced by dropping the metal into a drag cavity. This is not always applicable to certain types of castings. However, for the type casting under discussion this system can generally be used.

The construction of the riser and its connection to the casting is of importance, since it is the connecting area which feeds fluid metal from the riser to the solidifying casting. The form and size of the connection will vary with the changes in shape from one type of casting to another. However, good basic design is the one shown in Fig. 3.

The connector itself will generally do a good feeding job if the area of the connection is between 1/4 and 1/5 of the cross sectional area of the riser for example, if the riser is 2 in. in diameter then its area will be 3.1416 sq in. in area. The connecting area will then be between 0.628 and 0.785 sq in. in area. From this point back the distance to the riser should be at a minimum commensurate with molding and cut off practice, and the area should be faired into the riser at approximately 45 deg.

The size of the riser or risers for the casting is generally based on the yield factor that is inherent for the alloy. For instance, the red metal groups for average castings will run about 80 per cent yield, and those for manganese bronze and aluminum bronze, the high shrink alloys, will run about 50 per cent. Therefore, on a red metal casting weighing 80 lb the weight of the risers should be approximately 20 lb, and in the case of manganese bronze the weight of the risers should be 80 lb.

A Bibliography on Gating and Risering has been prepared by AFS and may be purchased from MODERN CASTINGS.

INDUCTION MELTING PUTS FABRICATOR INTO GRAY IRON PRODUCTION

DR. H. B. OSBORN / *Technical Director*
Ohio Crankshaft Co.

Quality is up, production costs down as Ohio firm begins producing castings

Gray iron melted in induction furnaces has upgraded the quality control at Commercial Shearing and Stamping Co., Youngstown, Ohio. This producer of hydraulic equipment has been able to improve its competitive position through its ability to produce gray iron and alloy iron castings using a sharply limited floor area.

In 1954, Commercial decided that it could improve its quality control by replacing purchased castings with those of its own production. However, the company could not afford to offset the advantages gained in quality control by turning over a large area of its badly needed floor space to castings production.

Chief engineer T. C. Kane explained that, "We had to come up with a good answer to the increased demand for quick in-plant delivery of quality castings for hydraulic pumps, motors, and cylinders. Our customer demand necessitated improvement in our delivery schedules and we couldn't afford to lag."

To maintain quality and establish start-to-finish control of melting and molding operations, the plant installed two 300 lb induction melting furnaces operating alternately from a 200 kw, 3000 cycle motor generator set. Complete with a shell molding line, the operation occupies only 5000 sq ft in the plant.

The two melting units deliver 600 lb per hour, and are now being operated on an 18-hour day. Two additional furnaces have been added, bringing the operation's melting capacity to 13,000 lb per day.

Castings being produced at Commercial range from 0.5 to 35 lb and are all components of hydraulic assemblies. The plant reports a significant improvement in its castings over purchased castings. Castings now being produced with shell molding and induction melting are said to have reduced machining operations, and to have upped the tensile strength of alloy castings from approximately 35,000 psi to 50,000 psi, while producing a substantial savings in the cost of castings.

RATIO OF RAW MATERIALS CHARGED

	Pig Iron	Scrap Iron	Scrap Steel
#1 Mix	67%	20%	13%
#2 Mix	58%	30%	12%
#3 Mix	42%	50%	8%

Iron from their own furnaces—Commercial's answer to competition.

CHEMICAL ANALYSIS OF MATERIALS USED

Pig Iron	Burn Off	Scrap Iron	Burn Off	Scrap Steel	Burn Off	Ferro Silicon	Burn Off	Ferro Moly	Burn Off	Copper Shot	Burn Off
3.90 C	.	3.25 C	.	.15 C	.	75.0 Si	4%	62.5 Mo	5%	99.5 Cu	.
1.90 Si	7%	1.90 Si	7%	.45 Mn	6%	21.0 Fe	.	37.0 Fe	.		
.90 Nn	6%	.85 Mn	6%	.02 P	.						
.03 S	.	.75 Cu	.	.04 S	.						
.10 P	.	.50 Mo	5%								

Shell molds move to the pouring station on a mobile pouring car.

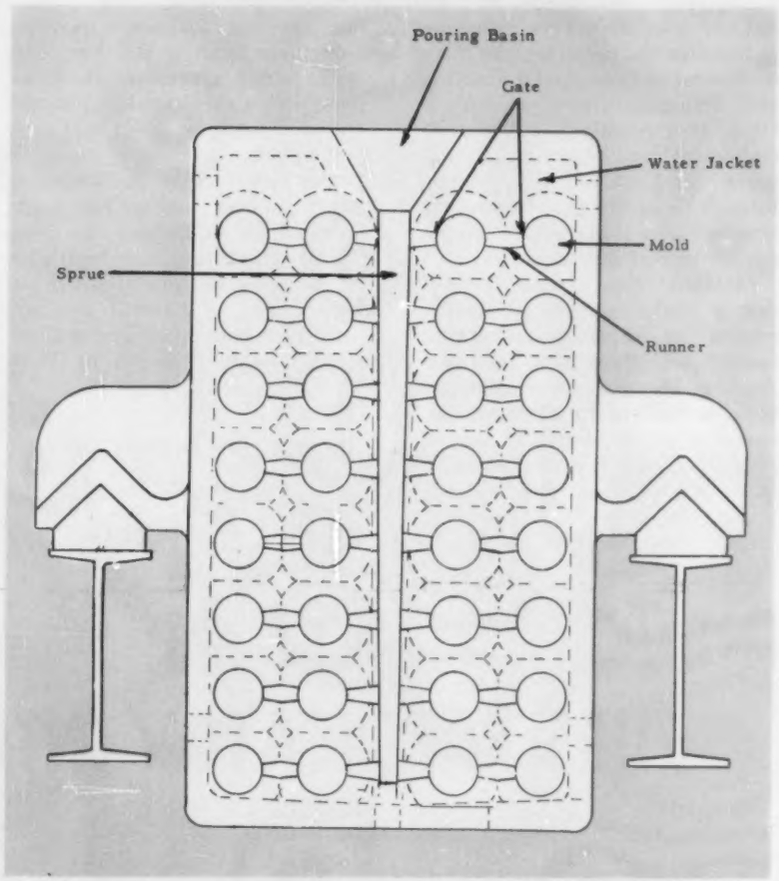
Prior to installing their own foundry, Commercial consumed a lot of time with rough machining operations. Machinists in the hydraulic division often found it necessary to remove as much as a quarter-inch of stock before the finish machine operation. With the new installation castings are made so close to final dimension that rough machining is not required.

With induction melting, foundry supervisor John Hesch reports the ability to control analyses within plus or minus 0.001 per cent. Because of the "homogenizing" effect caused by the stirring action of the induction melting process, iron density has been increased considerably. The end result of this control is a lighter and more useable casting.

One of the first large producers of hydraulic equipment to operate their own foundry, Commercial Shearing and Stamping is more than satisfied with their results and plans to install 600-lb capacity furnaces to further increase their production.

WHITE IRON CASTINGS for a Black Hills Gold Mine

LE ROY SEYHERS /
Chief Mech. Engr.
Homestake Mining Co., Lead, S.D.



Permanent, water-cooled molds are used in producing white iron balls used in crushing gold-bearing rock in nation's largest gold mine.

THar's gold in them thar hills, but it sometimes takes some first-class foundry practice to get it out. At the Homestake mine, Lead, S. D., the nation's largest producing gold mine, white-iron balls for the mills that crush the gold-bearing rock are now being cast in banks of water-cooled permanent molds.

The molds are arranged in two banks on the ball machine, which was designed and built by the Homestake Mining Co. When a mold in one bank is opened to remove the balls and gates, the mold in the other bank with which it is paired is closed automatically by pneumatic cylinder.

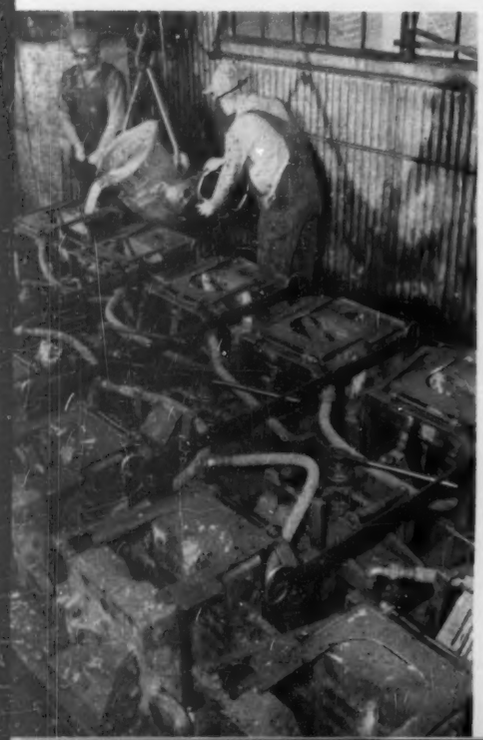
Balls pried out of the open molds drop into a chute leading to a tumbler. Discharged from the tumbler, the white-iron balls roll through a pipe to the ball mills where they will be used in crushing the gold-bearing rock.

Iron is melted in a 36-in. cupola. Each charge consists of 100 lb pig iron, 400 lb scrap iron, and 500 lb scrap steel. Thirty lb of limestone and 125 lb of coke complete the charge. The pig is omitted from every third charge, and 500 lb scrap iron and 500 lb scrap steel is charged.

Most of the scrap steel is drill steel. The pig iron used in producing the balls has the following analysis: silicon 1.25, manganese 0.20 to 1.60, phosphorous 0.30 max, sulphur 0.065, and carbon 3.0 to 4.0.

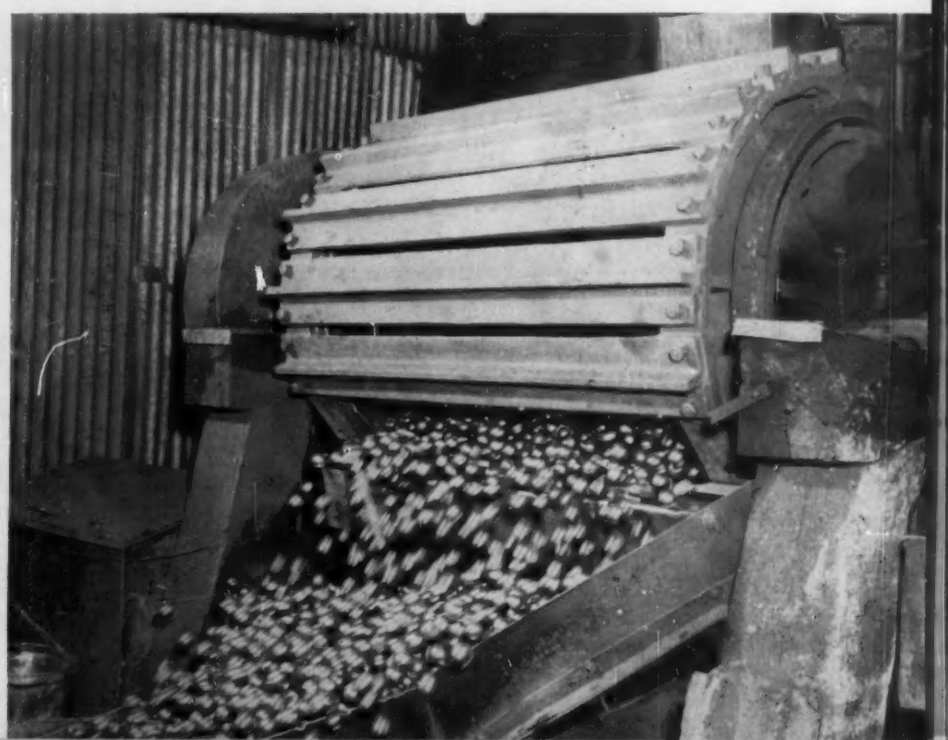
Iron is poured between 2400 and 2700 F and 20,000 lb of finished balls are produced from each total heat of 35,000 lb.

Balls are being cast in two sizes: 1.5 in. diam and 1.75 in. diam.



Drill steel is main source of scrap metal, pouring is done between 2400-2700 F.

Balls are pried out of open molds and drop into tumbler then run through a pipe to mills for use in crushing.



foundry trade news

Pangborn Corp. . . has signed a licensing agreement with Hepburn Conveyor Co., Ltd., Wakefield, England, for sole manufacturing and sales rights of Pangborn equipment in England, Scotland, Wales, Ireland, Australia, New Zealand, and Union of South Africa.

American Society for Metals . . has announced that a 2nd World Metallurgical Congress will be held in Chicago in 1957. More than 500 metal scientists from 35 nations are expected. The first world event was held in 1951.

Ford Motor Co. . . has announced that its new aluminum castings plant at Sheffield, Ala., will produce 140 tons of aluminum engine and automatic transmission parts daily. Castings will be produced by both permanent mold and die castings.

Federated Metals of Canada, Ltd. . . has officially opened a non-ferrous metal fabricating, processing, and refining plant in Toronto and is rushing completion of a facility in Montreal. The two plants will have a combined employment of about 200 and will smelt and alloy non-ferrous metals.

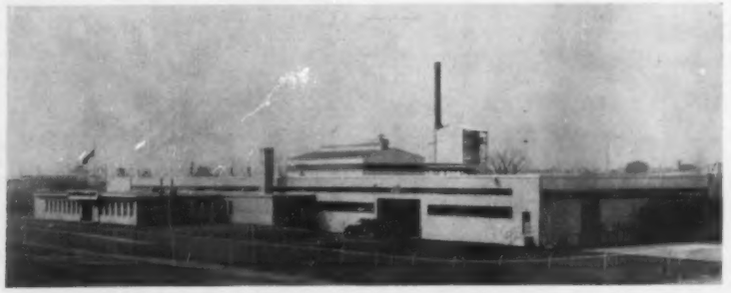
Central Foundry Co. . . Newark, N. J., firm has borrowed two million dollars for improvements and modernization of its cast iron soil pipe plant at Holt, Alabama. Prudential Insurance Co. is supplying the funds for improving these facilities of the world's largest cast iron soil pipe manufacturer.

American Brake Shoe Co., New York, and **Ampco Metal, Inc.**, Milwaukee, have joined with J. Stone & Co., Ltd., of London, the British developer of a new high-strength aluminum bronze alloy, to form Superston Corp. This new company will produce the alloy, known as Superston 40.

American Machine & Foundry Co. . . will build a $4 million research and development center in Stamford as headquarters for its Central Engineering Laboratories. AMF board chairman and president, Morehead Patterson, states that the site "offers the suburban atmosphere and seclusion conducive to the creative effort so necessary for research and development engineering."

W. J. Bullock, Inc. . . Birmingham, Ala., non-ferrous smelter is now packaging metal ingots in wirebound pallet bins that hold over a ton of metal. Bulk shipments have been dropped in favor of this method of shipment which is said to simplify materials handling.

Consolidated Foundries and Mfg. Corp. . . has announced formation of Michigan Industries Co., a wholly owned subsidiary which will include the following firms as operating divisions: Michigan-Standard Alloy Cast-



Federated Metals: now a plant in Toronto, soon one in Montreal.

American Machine & Foundry: seclusion for central engineering labs.

ings Co., WaiMet Alloys Co., Western Foundry Co., M. S. Machine Products Co., and Misco Fabricators.

Ampco Metal, Inc. . . was able to increase their regular quarterly stock dividend effect with the fourth quarter, despite their plant explosion October 8 (see album.) Firm's net sales for the first nine months were over 10 million dollars.

American Fdy. and Machine Co. . . Salt Lake City gray iron foundry has joined American Foundrymen's Society.

Lindberg Industrial Corp. . . is now building 14 aluminum reverberatory type furnaces for the Ford aluminum castings plant at Sheffield, Ala. The furnaces are so large that they must be constructed at the plant site.

Link-Belt Co. . . has moved its Cleveland office to a new building at 3592 Lee Road, Cleveland 20, Ohio.

Jeffrey Mfg. Co. . . Columbus, Ohio, manufacturer has opened a warehouse at 1862 Rollins Road, Burlingame, Calif., to serve its distributors in western states.

Mainland Foundry . . Vancouver, B. C., gray iron foundry has joined American Foundrymen's Society.

Canadian Steel Foundries (1956) Limited . . is new name of the Steel Foundry Div., Canadian Car & Foundry Co., Ltd. New organization is a separate corporate member of the A. V. Roe Canada Ltd. group.

Dike-O-Seal, Inc. . . Chicago company has offered to dike any core box used for instructional purposes by foundry labs in high, trade and vocational schools and colleges.

Duramold Castings, Inc. . . Mishawaka, Ind., has joined Non-Ferrous Founders' Society.

International Minerals & Chemical Corp. . . will build new general headquarter offices in Skokie, Ill. Cost of the new facility will approximate $3.5 million.

Herman Pneumatic Machine Co. . . has increased the territory represented by Edwin A. Swensson Co., Detroit, to include most of Ontario.

Gaines Co. . . Los Angeles organization has moved its foundry to new and larger quarters at 7903 Industry Ave., Rivera, Calif. Organized in

1950, the company is now one of the largest producers of air frame castings.

Grindle Division . . C. O. Bartlett & Snow Co.'s Grindle Division formerly located in Harvey, Ill., has been moved to the firm's main headquarters, 6200 Harvard Ave., Cleveland 5, Ohio.

Peerless Pipe & Fdy. Co. . . . Anniston, Ala., gray iron foundry has joined American Foundrymen's Society.

Hooker Electrochemical and **Oldbury Electro-Chemical** firms have consolidated.

Clark Equip. Co. . . . has opened a Chicago sales and service branch at 625 North Kedzie Ave., Chicago, Ill.

Electro Refractories & Abrasives Corp. . . . has announced price increases averaging 8 per cent of crucibles and refractories of similar composition. Increase is attributed to increasing labor and material costs.

Bohnert Equip. Co., Inc. . . . is new Baker - Raulang materials - handling truck distributor at 104 W. Main St., Louisville 2, Ky.

Neville Fdy. Co. . . . gray iron plant in Kansas City has joined American Foundrymen's Society.

Chain Belt Co. . . . Milwaukee firm has purchased General Road Machines, Inc. of Niles and Newton Falls, Ohio, and will operate the firm as a wholly owned subsidiary.

Waterbury Farrel Foundry & Machine Co. . . . Waterbury, Conn., firm has elected F. S. Van Valkenburg as chairman of the board and has named A. D. Mitchell as president.

New Haven Malleable Iron Co. . . . New Haven, Conn., malleable plant has joined American Foundrymen's Society.

Knute Palmquist Foundry, Inc. . . . Oakland, Calif., plant has been awarded a safety award certificate by its insurance carrier for its accident prevention record.

Lansco Die Casting Co. . . . die casting firm at El Monte, Calif., has been sold to New Plastic Corp.

City Machine & Mfg. Co. . . . Cleveland builder of steel mill equipment has been sold to a group of industrialists headed by T. W. Gulley.

the SHAPe of things

safety, hygiene, air pollution

by HERBERT J. WEBER

Nodular Iron and Nodular Lung Shadows

Many years ago I became acquainted with a compensation case for silicosis. The claimant's chest x-ray showed the usual nodular-like shadows typical of silicosis. Even though this man worked in the foundry cleaning room where the exposure was principally to iron oxide, he was awarded total permanent disability on the basis of the x-ray picture alone.

Some years later the man died and an autopsy was performed. His lungs showed no evidence whatever of silicosis. The nodular-like shadows seen in the x-ray were due to iron-dust deposits in the lungs. Iron dust in the lungs is radio-opaque and will show on x-ray nodular-like shadows very similar to those seen in a silicotic lung.

The medical term for this phenomenon is siderosis—a pigmentation of the lungs due to iron dust. Now siderosis may be compared to a tatoo mark on the arm—it is permanent but it is nondisabling. Just as the tatoo mark does not impair the function of the arm, so siderosis does not impair lung function.

Siderosis is frequently confused with silicosis because diagnoses are often based on x-ray findings alone. I know of a welder whose doctor told him he had silicosis because the welder's chest x-ray showed these nodular-like shadows. The doctor never troubled to find out that the man welded clean steel bars and had never been exposed to silica dust. The welder couldn't have silicosis unless he was exposed for a long period of time to sufficient atmospheric concentrations of free silica. Worse, the man was told to give up his trade and seek other employment, and he would probably be barred from other jobs. That man had no more silicosis than I have.

Another bad result of such faulty diagnosis is the anxiety inflicted on the man and his family. How would you feel if you, a perfectly healthy man, were told to change jobs and get ready for the end! I know how it feels because I was told the same thing twenty years ago.

Differential diagnosis of x-rays must be supported by *quantitative* evidence of significant atmospheric exposures. Unless the diagnosis can be supported by a *quantitative* history of exposure, in my opinion, it is suspect. I say *quantitative* because the fact that a man worked in a foundry does not mean he has had a sufficient exposure to silica dust to produce silicosis.

In spite of all this, compensation payments for nonexistent disability due to siderosis are still being made today.

In foundry practice, siderosis is more apt to occur in grinding, burning off and welding operations and then provided the ventilation system is inadequate.

Where the exposure is a mixed one, such as to both silica and iron and the nodular shadows are seen on chest x-ray, the competent physician will look for other symptoms and signs which are frequently present. They will enable him to evaluate the findings in as accurate a manner as is possible.

It should be remembered also that in the case of exposure to both silica and iron dust, the iron dust has a modifying effect on the development of the true fibrous nodules characteristic of silicosis. It is for this reason that some authorities do not recommend the use of aluminum dusting in the prevention of silicosis.

Of course proper exhaust ventilation will prevent the development of either silicosis or siderosis. But if you now have "silicotics" on your payroll, better take another look at the exposure. Maybe it's only siderosis after all.

committees in action

The Mold Surface Committee met in Coshocton, Ohio, September 14, with seven members present. Plans were formulated for testing the resistance of sand cores to metal penetration as affected by the degree of core ramming and the pouring temperature of woods metal, iron, brass, bronze, and aluminum. Three pouring temperatures for each metal will be based on the Btu/lb/degree superheat. C. E. McQuiston plans to present a paper on "factors affecting and methods for measuring surface finish" at the 1957 Castings Congress.

The Sand Division, Program and Papers Committee met in Chicago, September 20, with nine members present. H. F. Barr, Chief Engineer, Chevrolet Motor Division, General Motors Corp., has consented to deliver the keynote address at the Annual Sand Division Meeting. It was tentatively decided to also have five Sand Sessions, a Dinner highlighted by a talk on "Shell Cores," and a Shop Course with the theme —"Controlled Sand Results in Economy."

The Sand Division Executive Committee met in Chicago, September 21, with 12 members present. A five man special committee was appointed to consider a revised Sand Division Organization Chart and submit their recommendations. E. C. Zuppann and his committee are preparing a report on "Factorial Design". The Mold Surface Committee activity is summarized above. C. E. McQuiston, Secretary of this Committee, presented a report on "Design of Experiments." A "deformation tester" is being evaluated by the Calibration-Reproducibility Committee. Three core oils are being tested for acceptibility by the Bakeability Committee prior to developing a baking test for core sands. E. C. Zirzow was elected new Division Chairman and L. J. Pedicini, Vice Chairman.

The Radiation Protection Committee is now reviewing a rough draft of "Radiographic Procedures—General" prepared by Floyd Sutherland. This is being prepared as a chapter in the new Foundry Radiation Protection Manual.

for the asking

Shell molds in 37 to 60 seconds is the production story of the new Hutchinson machine. Three models, featuring unique method of hinging investment box to pattern carrying frame are described in brochure. *Hutchinson Shell Mold Co.*

CIRCLE NO. 62, PAGE 7-8

Tractor shovel with 4-wheel drive and brakes has a payload capacity of 1-1/3 cu yd. Model HU has carrying capacity of 4000 lb at 4 mph. Model HH has payload capacity of 1-3/4 cu yd with carrying capacity of 5500 lb at 4 mph. *Frank G. Hough Co.*

CIRCLE NO. 63, PAGE 7-8

Direct-reading conductivity meters are covered in reprint bulletin MT-4. It deals with a case history of sorting 10,000 red brass castings at the rate of 500 per hr. *Magnaflux Corporation.*

CIRCLE NO. 64, PAGE 7-8

Foundry equipment book 2423 contains complete installations, tested layouts, sand preparation equipment, mold, core, casting and sand handling equipment. *Link-Belt Company.*

CIRCLE NO. 65, PAGE 7-8

Cupola operating techniques are covered in eight-page bulletin No. FO-11. Illustrated with charts and photos, the bulletin discusses factors of cupola operation that affect combustion and melting conditions. *Whiting Corporation.*

CIRCLE NO. 66, PAGE 7-8

Fractional horsepower motor bulletin GED-2020B, 16 pages, explains various terms and application and selection data for 50 typical applications for home, farm and shop jobs. *General Electric Co.*

CIRCLE NO. 67, PAGE 7-8

Foundry cleaning applications in form of case histories are reported in two-page publication. Pictures show installations and work in progress. *Wheelabrator Corp.*

CIRCLE NO. 68, PAGE 7-8

Core blowing machinery ranging from 4½ to 300 lb models is covered in bulletin 5010 which includes diagrams, engineering data, construction features and specifications. *Beardsley & Piper Div., Pettibone Mulliken Corp.*

CIRCLE NO. 69, PAGE 7-8

Sands, moisture, binders and how they affect foundry cores are covered in a 12-page brochure complete with charts and illustrations. This is a condensation of several research projects. *Archer-Daniels-Midland Co.*

CIRCLE NO. 70, PAGE 7-8

Muller equipment for medium sand requirements is covered in Bulletin 520, four pages with pictures, drawings and specifications. *National Engineering Co.*

CIRCLE NO. 71, PAGE 7-8

Industrial radiography catalog, 16 pages, covers materials and accessories, and includes illustrations, charts, packing data, and film characteristics. *X-Ray Div., Eastman Kodak Co.*

CIRCLE NO. 72, PAGE 7-8

Laboratory equipment catalog No. 956 in 64 pages incorporates a current price list and many instruments

which have been added since general catalog was published. *Schaar & Co.*

CIRCLE NO. 73, PAGE 7-8

Automatic barrel machines which perform a complete metal finishing job are covered in *"Slants on Metal Finishing."* Advantages of machine and some of users are listed. *Frederic B. Stevens, Inc.*

CIRCLE NO. 74, PAGE 7-8

Thermocouples, featuring enclosed tips, are shown in eight-page catalog. It is well illustrated and includes products in use, parts and price list and descriptive material. *L. H. Marshall Co.*

CIRCLE NO. 75, PAGE 7-8

Continuous seal for use on core boxes is discussed in four-pages with drawings, pictures of applications and descriptive material. *Dike-O-Seal, Inc.*

CIRCLE NO. 76, PAGE 7-8

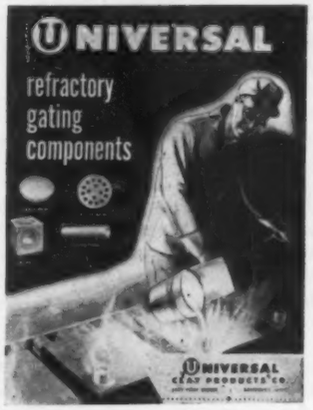
Micrometer reading explained is 12 pages, complete with illustrations, useful rules and decimal equivalents. *The Lufkin Rule Co.*

CIRCLE NO. 77, PAGE 7-8

Blast cleaning and dust control case histories are covered in four-page news brochure. Pictures show equipment in operation. *Pangborn Corporation.*

CIRCLE NO. 78, PAGE 7-8

Standard strainer cores, splash cores, elbows and tubes are the subject of four-page catalog which includes sizes and packaging and chart showing rates of metal delivery through



various cores. *Universal Clay Products Co.*

CIRCLE NO. 79, PAGE 7-8

Microscopes for research and industry are described in bulletin M-56, six pages. Models included are tool-

maker and metallurgical, inverted research, camera microscope, wide field binocular stereo, binocular inverted metallurgical and a camera attachment for 35 mm film. *Unitron Instrument Div., United Scientific Co.*

CIRCLE NO. 80, PAGE 7-8

"Casting Finish-Tolerance-Precision" a 12-page paper presented at the 60th Annual Castings Congress & Show of the American Foundrymen's Society, discusses the role of sand in controlling casting finish. *American Colloid Co.*

CIRCLE NO. 81, PAGE 7-8

Direct reading spectrometer analysis is contained in a four-page brochure which includes a description of equipment, developmental possibilities and case histories. *Applied Research Laboratories.*

CIRCLE NO. 82, PAGE 7-8

Epoxy resins and coatings, electrical insulating materials, adhesives and tooling materials are subject of a 12-page, colored catalog. Included are specific applications and case histories. *Houghton Laboratories, Inc.*

CIRCLE NO. 83, PAGE 7-8

"When Disaster Strikes", bulletin GEA-6484, 12 pages, tells how service shops can help plant recovery. Describes procedures for recovery of vital electrical equipment and lists a 5-step protective maintenance program. *General Electric Co.*

CIRCLE NO. 84, PAGE 7-8

Electronic, nondestructive testing instruments, FM-100 series, are discussed in four pages listing range and calibration, method of operation, power requirements and theory. *Magnaflux Corporation.*

CIRCLE NO. 85, PAGE 7-8

Instrumentation bulletin G-2 in 20 pages covers product, technological and application literature. In addition it contains a complete alphabetical index of subjects and companies covered by *Instrumentation* magazine articles over the past 10 years. *Industrial Div. Minneapolis-Honeywell Regulator Co.*

CIRCLE NO. 86, PAGE 7-8

Beryllium casting ingots and master alloys are explained in bulletin No. 3, four pages. Included are tables of typical properties. *The Brush Beryllium Co.*

CIRCLE NO. 87, PAGE 7-8

Electric furnace case histories in two plants are covered in eight-page brochure which contains graphs, pic-

tures and drawings to illustrate the strong points of electric furnaces. *National Carbon Co. Div. Union Carbide & Carbon Corp.*

CIRCLE NO. 88, PAGE 7-8

Air powered presses including bench, arbor and platen type are outlined in four-page catalog. Information includes specifications, pictures and applications. *Van Products Company.*

CIRCLE NO. 89, PAGE 7-8

Shaw process which is being licensed in this country is explained in eight-page brochure complete with pictures showing sequence of operations and range of items which have been cast with process. *Shaw Process Development Corp.*

CIRCLE NO. 90, PAGE 7-8

Wet blast equipment catalog, 56 pages, covers line of manual, semi-automatic and automatic components including illustrated case histories. *The Cro-Plate Co., Inc.*

CIRCLE NO. 91, PAGE 7-8

Inoculation's metallurgical aspects for cast iron are covered in a 16-page illustrated booklet. The alloy is designed to reduce chill depth and improve machinability, tensile strength and transverse properties. *Electro Metallurgical Co., Div., Union Carbide & Carbon Corp.*

CIRCLE NO. 92, PAGE 7-8

Heavy duty vibrators using the principal of the reciprocating piston are covered in eight-page catalog containing illustrations, specifications and pictures. *Vibron Div., Burgess-Sterbentz Corp.*

CIRCLE NO. 93, PAGE 7-8

Conveyor pulley catalog contains 12 pages with detailed specifications on engineering drawings, illustrations and descriptive matter and prices. *R & J Dick Co., Inc.*

CIRCLE NO. 94, PAGE 7-8

Industrial cleaning compounds and solvents, the complete line, is covered in an eight-page bulletin. Contains photographs and product applications. *Brulin & Co., Inc.*

CIRCLE NO. 95, PAGE 7-8

Cold-setting flexible mold compound is subject of Bulletin No. 12 which gives physical data, preparing and removing the model, casting into the mold. *Smooth-On Mfg. Co.*

CIRCLE NO. 96, PAGE 7-8

Non-rotating air cylinders, 21 models, are discussed in 12-page illustrated catalog. It contains complete

engineering data on company's cylinders, valves and accessories. *S-P Mfg. Corp.*

CIRCLE NO. 97, PAGE 7-8

Concrete floor patching or overlaying with Stonpach is discussed in six-page folder. It may be applied as thin as one-half in. with compressive strength said to be greater than concrete. *Stonhard Company.*

CIRCLE NO. 98, PAGE 7-8

Basic Steel manufacturing is discussed in a 12-page illustrated booklet covering both basic and acid furnace operations and estimates probable conversion costs. *Basic Incorporated.*

CIRCLE NO. 99, PAGE 7-8

Self-propelled "Railporter" which runs on a single rail is covered in bulletin 56-47, eight-pages. Pictures show how unit is stabilized by means of four outboard rollers riding on side flanges of rail. *Construction Machinery Div., Chain Belt Co.*

CIRCLE NO. 100, PAGE 7-8

Induction motor bulletin 05B8123A covers two-pole squirrel-cage induction motors, 900 hp and larger. Construction details include description of its spiral ventilation system. *Allis-Chalmers Mfg. Co.*

CIRCLE NO. 101, PAGE 7-8

Gun patching of cupolas with monolithic lining with refractory gun are covered in four-page bulletin. *Eastern Clay Products Dept., International Minerals & Chemical Corp.*

CIRCLE NO. 102, PAGE 7-8

Direct-current motors, ½ through 200 hp and motor-generator sets through 200-kw output are described in bulletin 53B8424, six pages. Included is a cutaway highlighting the features. *Allis-Chalmers Manufacturing Company.*

CIRCLE NO. 103, PAGE 7-8

Lift stackers, cranes and elevators are discussed in Catalog 56, eight pages. Included are photos of units in use, specifications and prices. *Red Tiger Products, Inc.*

CIRCLE NO. 104, PAGE 7-8

Fluorescent lighting for industrial installations is subject of Bulletin B, 36 pages describing 394 units. Systems are discussed for various applications. *Benjamin Electric Mfg. Co.*

CIRCLE NO. 105, PAGE 7-8

Overhead conveyor known as "Chainveyor" is covered in four-page catalog which includes pictures of instal-

lations. Conveyor is said to run in any direction including upside down. *Chainveyor Corp.*

CIRCLE NO. 106, PAGE 7-8

Gas oven control "Oventrol", a combination gas cock and oven thermostat is described in bulletin RT-781 which contains a cutaway view and diagrams. *Robertshaw-Fulton Controls Co.*

CIRCLE NO. 107, PAGE 7-8

Conveyor which utilizes flat side skirts as links is covered in bulletin PL9, four-pages, which uses photographs and diagrams to show features and installation. *Hapman Conveyors, Inc., Div., Hapman-Dutton Company.*

CIRCLE NO. 108, PAGE 7-8

Blast nozzle with tungsten-carbide liners are covered in bulletin G-1 1-55, two pages. Illustration shows new design of nozzle. *Vacu-Blast Co., Inc.*

CIRCLE NO. 109, PAGE 7-8

Rotary finisher and buffer for abrasive finishing operations is covered in two page catalog sheet listing specifications and picture of unit. *Mathewson Machine Works, Inc.*

CIRCLE NO. 110, PAGE 7-8

Welding equipment, both semi-automatic and automatic for use in CO_2 and inert-gas metal-arc welding is discussed in six pages of pictures, diagrams and cutaways. *National Cylinder Gas Company.*

CIRCLE NO. 111, PAGE 7-8

Conveyor equipment including patented products and custom built equipment are covered in Cat. 500, 48 pages with photos, drawings, layouts, charts and engineering data. *Prab Conveyors, Inc.*

CIRCLE NO. 112, PAGE 7-8

Refractory, air setting cement, its mixing and application are explained in bulletin CP7.4, two-pages. This highly refractory cement is designed for high temperature applications with minimum of slag. *Norton Company.*

CIRCLE NO. 113, PAGE 7-8

Chaplet catalog No. 56 lists double-headed models up to 1¼ in. stem diameters. The 12 page publication is a reference for radiator, motor, boiler and single-head forged and fitted head chaplets. *Cleveland Chaplet & Mfg. Co.*

CIRCLE NO. 114, PAGE 7-8

NFA Discusses Management Front

Building a strong, united management front and establishing better communications throughout the plant were the themes of the 58th annual meeting of the National Foundry Association held October 11-12 at the Sheraton-Cadillac Hotel, Detroit.

Paul Arnold, N.F.A. president, United States Pipe & Foundry Co., Chattanooga, Tenn., opened proceedings with the president's report followed by *"United Labor Front Requires a Strong, United Front"* presented by N.F.A. vice-president, Arthur G. Hall, Nordberg Manufacturing Co., Milwaukee.

Hall stated that with the merger of organized labor and the expansion of its research, organizational and political activities, alert foundry management finds it more vital than ever before to have essential facts and knowledge readily available.

"Developing Effective Employee Communications" was discussed by Dr. Paul J. Mundie, Humber, Mundie & McClary, Milwaukee. A consulting psychologist, Dr. Mundie said that proper and effective communications were becoming increasingly important since mistakes may be extremely costly. Executive communication is the heart of the employee problem and it is the role of management to develop a company philosophy and goal and to inform its members of its aims, he said.

Suggested steps in improving communications included better communication between family members, an increased number of executive meetings to discuss not only business problems but also to deal with personal improvement, the maintaining of a written evaluation of every person interviewed with notes for future reference and the publishing of house organ publications on a regular basis. The latter, he said, serves not only as an effective method of communication but also gives members a feeling of belonging to the organization.

Dr. Mundie encouraged the formation of discussion groups for all management employees and suggested that such programs should be planned by outside groups to present a well balanced schedule.

Dr. John K. Langum, economist, Business Economics, Inc., Chicago, discussed economic conditions and business prospects at the luncheon. He predicted a strong business picture at least until the second quarter of 1957. This, he said, is based on rising plant equipment expenditures, increasing inventories, government spending and likely increases in auto and retail sales.

Over a longer period Dr. Langum foresees the possibility of a distinct downturn in the business picture but that with various economic and governmental controls sees no possibility of conditions such as existed in the early 1930s. The future, he stated, would be one of increasing production with an increasing standard of living.

In the afternoon a panel discussion was held on the steward-foreman relationship. Members were Ray F. Heiden, Galva Foundry Co., Galva, Ill., moderator; N. T. Booth, Deemer Steel Casting Co., New Castle, Dela.; R. L. Jackson, Jackson Industries, Inc., Birmingham, Ala.;

NFA Administrative Council. Seated clockwise, C. T. Sheehan, Arthur G. Hall, Martin J. Ewald, Curtis B. Hasty, Jr., Harold W. Warner, Ray F. Heiden, Robert M. Walton, C. A. Carolin, Warren A. Brown, R.C.S. Potter, A. V. Martens, Eugene F. Schlickman, William J. Bulman, Andrew E. Jencks, W. W. C. Ball, A. Lysle Dyer, R. R. Washburn, W. G. Greenlee, J. C. Meyers, Jr., George Grosser, R. Redmond and Paul R. Arnold.

E. S. Mathiesen, Cutler-Hammer, Inc., Milwaukee; and Harry J. Kelley, American Seating Co., Grand Rapids, Mich.

The panel agreed that foremen should have a thorough understanding of the company policy, labor contract and the steward relationship. The foreman should be trained to be a good listener, to recognize likely grievances and to work harmoniously with the union.

The installation of officers completed the program for the first day. All officers were re-elected, they are Paul L. Arnold, *president*, Arthur G. Hall, *vice-president*, Frank J. Sherwin, Chicago Hardware Foundry Co., North Chicago, Ill., *treasurer* and C. T. Sheehan, *executive secretary*.

Friday's activities opened with a panel discussion on smoother bargaining with both management and labor representatives. Members were: Albert J. Graf, The Cottrell Co., Westerly, R. I., moderator; W. M. Bucher, and Swayne, Robinson & Co., Richmond, Ind.; W. G. Raven, Continental Motors Corp., Detroit; Joseph McCusker, United Auto Workers; and Frank Voit, International Molders and Foundry Workers' Union.

All members agreed that mutual respect is needed in any union-management relationship and that personalities had no place in an orderly discussion.

Mr. McCusker stated that unions must be regarded as a part of the nation's economy and that the functions of the unions include not only planning for his immediate needs but also for the future. Mr. Voit said that most labor contracts could be greatly improved by simplification of contracts and the elimination of qualifying conditions.

On the management side it was stated that unions sometimes must lower their standards to aid management and that unions should not try to impose on individual firms conditions granted in other locations or other industries.

Following luncheon, Dr. George D. Heaton, Myers Park Baptist Church, Charlotte, N. C., talked on *"The Common Goals of Employers and Employees."* He said that the difference between failure and success of a business is often due to the company's relationship with employees. Businesses which are "person-centered" will outproduce those that are not, he emphasized. To achieve this he recommended that employees be given self-recognition, be allowed to participate in the solution of their problems and be allowed to have his problems understood.

dietrich's corner

by h. f. dietrich

Let's face it! The journeyman has gone the way of the Indian scout, the court jester, and the town crier. The fact that he has joined the others in the limbo of lost occupations is not in itself cause for alarm, but the reason for his passing will give us something to think about. We have lost our pride in individual workmanship!

Before you take that deep breath with which you will tell me that we make the best, the biggest, and that we make them the fastest, let me give you an example of what I mean.

A number of years ago – more than I care to remember – I unrolled my bag of tools in the crane bay of the old National Brake Steel Foundry. On the floor beside me I met Walter, as meticulous a sandrat as ever handled a lifter. If some pattern bull caused a cope he had rammed to rat off, he would give the hanging cope a patch that was a work of art. Michelangelo would have admired the way Walter handled a trowel while his neck was bent at right angles to his back. When Walter wedged a chuck to a bar, the chuck was there to stay. He would give it a final tap with the hammer to test it for sound. Walter and I worked together for thirty-six hours closing a pit job. At the end of that time he didn't miss a wedge. If you asked him, he would tell you the pattern number of the job he was working on, whom it was for, the weight of the casting, and its use. Beside the foundry mark he would imprint his initials with one of the three blocks he carried. That was to tell the world that Walter made the mold.

Fifteen years later, I met Walter again. He was working in the main bay of another steel foundry. When the pattern chaser picked up Walter's pattern, he found an eight inch coreprint missing. Walter had left it in the cope, sprayed it with mold wash, and sent it to the oven to bake. A week later, he clamped one side of a floor mold, cleaned up his floor, and went home. He had discarded his initial blocks.

You say that is just one molder who hit the skids? Don't believe it! It is a trend of the times in which we live. We have lost pride in our workmanship. The condition is not unique to the foundry. It is general attitude we have developed through the years. There are hundreds of Walters in all trades.

Other indexes of progress are literature and drama. In the days of Twain and Dumas, flowery words and phrases were combined to produce humor, pathos, and drama. It required the skill of an artist to die convincingly while he waved his arms, rolled his eyes, and made long moral speeches, or sang an aria as he bit the dust.

We strip our literature of sunsets; – who has time to watch them? – We shorten our sentences by ellipses; strip the plot to the bare bone, and speed-read the first and last lines of a paragraph. We depend upon condensed versions of long books. Our education is given us by literary hypodermic. The art of reading and writing has fallen into disuse. Craftsmanship has been lost to supersonic speed. WE DO NOT HAVE TIME.

H. F. Dietrich . .

. . is the gen-u-wine article, a real foundryman. He spent five years of his youth working his way from Milwaukee to Portland, Ore., as a journeyman molder in steel foundries. When things picked up after the depression, he turned his hand to gray iron molding. After the 8th grade, Dietrich abandoned formal education until he entered college in 1948 at the age of 42. He is now head of the foundry department, Kansas State College.

ASTM Reports Studies of Cast Metals Specs

■ With research and development on metals for castings, expanding at a rapid rate, American Society for Testing Materials technical committees are being provided with plenty of grist for the standards mill. The current ASTM Bulletin summarizes activities of several of these committees which are of particular interest to the castings industry.

Committee A-3 on Cast Iron is considering the feasability of including in Specifications A 43 the grades of pig iron particularly suited for the production of nodular irons. The design of gray iron test bars and the determination of tensile strength is being reviewed by a task group. Preliminary drafts of a recommended practice for the application of cast irons to low-temperature service are now being revised.

Atmospheric corrosion of malleable iron at various locations is being studied by Committee A-7 on Malleable Iron Castings.

Approximately ten specifications covering nickel and nickel alloys have been undergoing extensive revision by Committee B-2 on Non-Ferrous Metals and Alloys. Included, are two new specifications for Hastelloy alloys in wrought and cast form—expected to be published early in 157.

GIFS Elects For '57

J. Scott Parrish, Jr., Richmond Fdy. and Mfg. Co., Inc., Richmond, Va., was elected president of the Gray Iron Founders' Society at its 28th Annual Meeting on October 31.

A. M. Nutter, E. L. LeBaron Fdy. Co., Brockton, Mass. was named vice president and A. H. Renfrow, Renfrow Fdy., Los Angeles, and H. J. Trenkamp, Ohio Fdy. Co., Cleveland, were elected secretary and treasurer, respectively. Cecil R. Garland, W. O. Larson Fdy. Co., Grafton, Ohio was named assistant treasurer.

New members of the board of directors also elected at the meeting were H. P. Good, Textile Machine Works, Reading, Pa.; Earl Paltenghi, H. C. Macaulay Fdy. Co., Berkeley, Calif.; A. L. Dyer, Buckeye Fdy. Co., Cincinnati; J. E. Quest, J. F. Quest Fdy. Co., Minneapolis; and W. A. Hepburn, John T. Hepburn, Ltd., Toronto, Canada.

D. H. Workman, executive vice president, and Charles F. Walton, technical director, were re-appointed for another year.

CIRCLE NO. 151, PAGE 7-8

At 46 places around the nation each month, members of the American Foundrymen's Society assemble for meetings of local AFS chapters. Although each of these chapter varies in its history, in its size, and in its program, the pictures here illustrate some things that happen on every . . .

local foundry news

Chapter Meeting Night

Executive Committee Session. Before a meeting featuring a talk by J. E. Stock, John Deere Waterloo Tractor Works, **Chicago** Chapter heads talk things over. Left to right, J. T. Moore, director; R. P. Schauss, president; Robert Doelman and John Rassenfoss, directors.

Speaker. C. E. Fausel, from Central Foundry's Danville plant was at **Central Ohio.**

Speaker. Wm. Geisler, from Davenport Machine & Fdy., was on deck for **Quad City.**

After The Show. Plenty of questions for the speaker is a characteristic of chapter meetings. Here, **Texas** Chapter speaker Frank Scaggs, Oklahoma Steel Castings, holds a session with Joe Kartye, Art Guidi, and P. C. Biven, all from Texas Foundries, Inc., Lufkin.

Common interests brought together New York foundrymen and H. Peters, works director of the Birmingham Aluminum Co., Birmingham, England for an informal international meeting. The group met in Syracuse, N. Y. during October. A previous meeting had been held with Syracuse members and J. W. Berry, joint managing director of the English firm. Seated in the front row, left to right are Malcolm Baldridge, Frazer & Jones Co.; George Stanton, Stanton Foundries; William D. Dunn, Oberdorfer Foundries; H. Peters, Birmingham Aluminum Co.; James Jardine, Jardine Bronze Co.; R. J. Denton, R. J. Denton Co. Standing are Thomas Dungey, Wolf & Dungey Co.; Nate Meloon, Meloon Bronze Fdy.; George P. Stanton, Jr., Stanton Foundries, Charles Meister, Jardine Bronze Co., Donald Krueder, Foundry Service Company.

Holding offices for 1956 in the **Toledo** Chapter are these officers and directors: standing, left to right, are the directors: C. E. Eggenschwiler, Bunting Brass & Bronze; Paul Guilford, Central Foundry Div., GMC, Defiance; C. Wandtke, Schill Pattern; Dan Schmidt, Bunting Brass & Bronze; M. E. Boyd, Maumee Pattern Co.; Ted Giszczak, Central Foundry Div. GMC, Defiance; Bill Miller, Unitcast Corp.; Barney Beierla, E. W. Bliss Co.; V. E. Zang, Unitcast Corp.; C. M. Hannaford, Unitcast Corp. Officers, seated: Martin J. Gruhler, vice-chairman; Cloyce W. Taylor, chairman; LeRoy F. Schultz, secretary; Roy C. Ensign, treasurer.

Making the wheels go around in the **Northwestern Pennsylvania** Chapter are: front row, W. C. Peelman, director, Erie Malleable Iron Co.; E. J. Bonesteel, vice-chairman, General Electric Co.; R. L. Johnson, chairman, Bucyrus-Erie Co.; and directors James Markowitz, Cascade Foundry Co.; Paul Green, General Electric; and J. Diemert, Erie Casting Co. Standing are directors F. P. Harter, Corn Products Sales Co.; A. Wightman, Lakes Laboratory; John Considine, Griswold Mfg. Co., R. W. Griswold, national director, Erie Malleable Iron Co.; O. C. Bueg, Arrow Pattern and Eng. Co.; F. P. Volgstadt, Cleveland Flux Co. Photographer was another chapter director, Walt J. Yahn, American Sterilizer Co.

William Hambley attracted 225 **Northeastern Ohio** Chapter members to his discussion of "Casting Defects." Left to right are, Claude Jeter, program chairman, Ford Motor Co.; Hambley, consultant for Chas. Krause Milling Co.; and A. D. Barczak, chairman, Superior Fdy., Inc.

Management representatives at **St. Louis** Chapter are swapping ideas about supervisor development. Left to right are: L. C. Farquhar, American Steel Foundries; chairman J. O'Meara, Banner Iron Works; guest speaker T. P. Tierney, Monsanto Chemical Co., C. B. Shanley, Semi-Steel Casting Co.; W. L. Rammerer, Midvale Mining & Mfg. Co.

Cupola operations were investigated at **Chesapeake Chapter** by W. W. Levi, Radford Foundry; Harvey Henderson, Lynchburg Fdy. Co.; speaker H. H. Wilder, Vanadium Corp.; and Lewis H. Gross, chapter chairman.

William B. Coleman Night at the **Philadelphia** Chapter featured the presentation of the second annual Wm. B. Coleman Scholarship in memory of the late secretary-treasurer of the group. Presented each year to a Pennylvania State University student, this year's award went to Joseph Zborney, a Penn State senior. Above are D. E. Best, Bethlehem Steel Co., chairman of the scholarship fund committee; Prof. Dan Clark, Penn State; winner Zborney; and C. W. Mooney, Jr., Olney Foundry, member of committee now soliciting scholarship funds.

Ladies Night found the **Detroit** Chapter entertaining at the Detroit Yacht Club. Enjoying the nautical atmosphere with whole-hearted enthusiasm are Mmes. H. Brauner, W. Yaw, R. W. Mott, and H. Goodhue.

Ohio Foundries Lead in Castings Show Exhibits

■ Sparked by the success of the International Foundry Trade Fair in Dusseldorf, Germany, applications for exhibit space at the American Foundrymen's Society 1st Engineered Castings Show are being received from all segments of the castings industry.

W. N. Davis, exhibits manager, states that applications have been received from foundries making castings from gray, ductile, and malleable iron, steel, aluminum, magnesium, brass and bronze.

Manufacturers of patterns and core boxes made of wood, metal and plastics are also exhibited, along with companies making laboratory and test equipment.

Exhibitors in this show are strictly limited to four industrial groups:

1) Companies producing metal castings for sale.
2) Manufacturers of laboratory equipment for testing and quality control.
3) Producers of metals and alloys contributing to castings quality.
4) Companies producing patterns for sale.

Thus far more applications have been received from companies located in Ohio than any other state. Over half are from the two states of Ohio and Illinois.

Davis emphasizes the opportunity made possible by this exhibit for foundrymen to demonstrate their abilities to the design and production engineers who will be in attendance.

S. C. Massari, technical director of AFS, says "the technical program of papers has been broadened so as to appeal to the users and prospective users of castings in all industries". This program will be built around the theme of the show—the quality, utility and economy of castings.

Applicants for exhibit space are urged to submit requests for space to W. N. Davis, Exhibits Manager, American Foundrymen's Society, as soon as possible since the deadline is rapidly drawing near.

Safer, Saner Solvent

Foundry maintenance employees may be spared the dangers of performing cleaning operations with solvents whose vapors are toxic.

The American Industrial Hygiene Association now recommends an all but unknown solvent material, methyl chloroform, for such jobs as cleaning electric motors. This solvent is a substitute for carbon tetrachloride and is now available commercially.

New York Mobilizes to Cut Accidents

The Consultative Approach. This is the weapon the castings industry in New York State and the New York State Department of Labor will use to battle the accident rate in New York foundries.

On June 12 New York's Industrial Commissioner Isador Lubin called a meeting of representatives of the foundry industry in Syracuse, N. Y. His purpose was to enlist the cooperation of men of industry in eliminating accidents in New York State.

He pointed out that approximately 70 per cent of industrial accidents in New York State occurred in situations beyond the law-enforcement power of the industrial commissioner. In other words, many accidents occur in spite of rigid inspection and safe working conditions. The majority of these accidents are due to unsafe acts of employees.

Realizing that factory inspection alone will eliminate only a minority of accidents, the commissioner sent 60 of his factory inspectors to Cornell University for safety training. These men are now known as safety advisors—not factory policemen and they have been assigned to visit all foundries of New York State, giving particular attention to those lacking full-time safety men. The purpose is to assist plants in their accident-prevention work on a wholly voluntary basis.

In inaugurating the new consultative approach in the state-wide accident prevention program, Commissioner Lubin stated that he is convinced that progress in accident prevention can best be made by cooperation between management, employees and law enforcement officers.

The first efforts of the campaign were directed to the foundry industry because: 1) It is one of the largest employers of labor. 2) It is a basic industry which is important to the nation in terms of preparedness and national defense. 3) It is a key industry for peacetime manufacturing processes. 4) It is composed of a relatively large number of small plants.

The operational method of the consultative approach is to be as follows:

First, the safety advisor assigned to each foundry will explain to top management the purpose and method of operating the program. If management wishes to cooperate, the safety service man will proceed to the second step, that of studying the accident record of the plant in detail, in order to determine the causes of specific accidents. This phase of the procedure will also involve a careful examination of the plant's physical facilities in terms of safety hazards. On the basis of these analyses the safety adviser will prepare a report and suggest a program.

The next step is to determine how and how much of this program can be adopted and put into action.

On September 27 and 28 Governor Harriman's Worker Safety Conference was held at Albany. Over 1000 persons attended. Discussion groups representing industry, labor, insurance, professional safety, the community, and construction held separate sessions dealing with this new state safety program.

On October 5, at the invitation of the Western New York Chapter of AFS, First Deputy Commissioner Charles Halloran addressed the chapter on the consultative approach. Summarizing the objectives and conclusions of the program, Halloran praised the foundrymen's reaction as "excellent" and declared, "Each one of you is to be congratulated on the objective attitude that you have displayed and on your willingness to cooperate in this program."

Foundrymen leading Consultative Approach safety campaign: left to right, H. J. Weber, AFS; Milton Emery, chairman, Western N. Y. Chapter, AFS; and Wm. C. Stevenson, director, Eastern N. Y. Chapter, AFS.

obituaries

Deming H. Lucas, 71, manufacturers' agent, passed away November 5. Mr. Lucas was a manufacturers' representative in Chicago since 1933 and was active in the Chicago Chapter of American Foundrymen's Society, serving as a director for many years and as membership chairman from 1940-54.

M. H. Liedtke

Martin H. Liedtke, 59, general superintendent, Farmall Works Foundry, Rock Island, Ill., died suddenly October 28.

Mr. Liedtke began his career as a molder in the Farmall Works Foundry in 1927, continuing his Harvester service as foreman of the molding department until 1941, when he moved to Milwaukee Works as assistant general superintendent of the foundry. He returned to the Farmall Works in 1942 and was promoted to general superintendent in 1945.

Mr. Liedtke was a past chairman in the Quad City Chapter of AFS.

Charles Reymann, Sr., chairman of the board, Atlantic Foundry Co., Akron, Ohio passed away October 11. Mr. Reymann, who has not been active in the foundry for several years, would have been 87 this year. He was a member of the American Foundrymen's Society and the Gray Iron Founders' Society, Inc.

Herbert T. Herr, Jr., president, J. S. McCormick Co., Pittsburgh, died recently.

William J. Brennan, Sr., 76, president, Geneva Foundry Corp., Geneva, N.Y., died September 22. Mr. Brennan purchased the foundry in 1921 and operated it as president and general manager until his death.

SUMMARY OF SPECIFICATIONS FOR GRAY CAST IRONS AND NODULAR (Ductile) CAST IRONS

This summary is intended to cover the more commonly used specifications. It includes primarily mechanical properties and chemical composition where specified, but it does not present all details of the specifications. Reference to the complete specification is recommended when it is to be used in commerce. Standards such as methods of tests, recommended practices, definitions and less commonly used specifications are included in the supplementary list below.

Due to the important influence of the individual design on the characteristics of a casting, requirements such as actual strength, dimensional tolerances, and surface finish cannot be stated in a general specification. These are usually established on a most satisfactory basis by personal liaison with the foundry. Any suggestions for improvement of this summary will be gratefully received and considered for inclusion in subsequent editions.

Charles F. Walton, Technical Director
Gray Iron Founders' Society, Inc.

SUMMARY OF GRAY IRON SPECIFICATIONS

Specifying Body (1)	Spec. No. (1)	Use	Class	Min. Tensile Strength psi	Brinell Hardness	Other Requirements	Typical Applications
A.S.T.M. A.S.A.	A 190-47 G 27.1-1942	Where strength and microstructure are not a prime requisite				Specific qualities usually established by sample. Hardness and other properties may be established by agreement.	Light weight and thin section castings requiring good appearance, high machinability, and close dimensions.
						Transverse Strength (2)—Breaking Load—Min. Pounds (3)	
A.S.T.M.	A 48-48					.875" Bar, 12" Span / 1.2" Bar, 18" Span / 2.0" Bar, 24" Span	
A.S.A.	G 28.1-1943	General castings not covered by other specifications and in which strength is a consideration	20 25	20,000 (3) 25,000 (3)		900 1025 / 1800 2000 / 6000 6800	Same as A 190 with minimum tensile requirements.
A.S.M.E.	S 61-1948						
A.A.S.H.O.	M 105-49	These specifications are all basically the same.	30 35	30,000 (3) 35,000 (3)		1150 1275 / 2200 2400 / 7600 8300	General machinery, municipal and water works, light compressor bodies.
C.S.A.	S 61-1948						
Federal	QQ-I-652a		40 45	40,000 (3) 45,000 (3)		1400 / 2600 / 9100	Machine tools, medium gear blanks, heavy compressors, motor blocks.
			50 60	50,000 (3) 60,000 (3)		1675 1925 / 3000 3400 / ‡10300 ‡12300	Dies, high pressure cylinders, heavy duty machine tool parts, large gears, press frames.
						Transverse Test—1.2" Dia. 18" Span: Strength Min. Lbs. / Min. In. Deflection; Total Carbon; Microstructure	
A.S.T.M.	A 159-55	Automotive Gray iron castings	110	20,000 (4)	187 Max. (5)	1900 / 0.15	Miscellaneous soft iron castings in which strength and microstructure are not of primary consideration.
			111	30,000 (4)	170-223 (5)	2300 / 0.20	Small cylinder blocks, heads, pistons, clutch plates, oil pump bodies, gear boxes, clutch housings, lightweight brake drums.
S.A.E.	Individual spec. number given in Class Column		113	38,000 (4)	179-229 (5)	2700 / 0.30 / 3.4% Min. / Note—(6)	Brake drums and clutch plates for moderate service requirements where high-carbon iron is desired and heat checking is a problem.
			114	40,000 (4)	207-269 (5)	3000 / 0.27 / 3.4% Min. Mandatory / Note—(7)	Heavy duty drums and clutch plates where both strength and resistance to heat checking are definite requirements.
			120	33,000 (4)	187-241 (5)	2400 / 0.24	Automotive cylinder blocks, heads, flywheels, cylinder liners, pistons.
			121	40,000 (4)	203-235 (5)	2600 / 0.27	Truck and tractor cylinder blocks, heads, heavy flywheels, tractor transmission cases, other similar castings.
			122	45,000 (4)	217-269 (5)	2800 / 0.30	Diesel engine castings, liners, cylinders, pistons, and heavy parts in general.
						Carbon (8) Equivalent 3.8% Max. / % P 0.25 Max. / % S 0.12 Max. / Casting and test bars must be stress relieved by prescribed heat treatment.	
A.S.T.M.	A 278-56	Pressure containing parts for use at 450° to 650° (9)	40 (9)	40,000 (7)			Valve bodies, papermill drier rolls, chemical process equipment.
			50	50,000 (7)			
			60	60,000 (7)			
						Carbon (7) Equivalent / Carbon % Min. / % P Max. / % S Max. / % Cr.	
A.S.T.M.	A 319-53	For superior thermal shock resistance	I	Deliberately soft, low strength (10)		3.81—4.40 / 3.50 / 0.60 / 0.12 / (11)	
	Non-pressure containing parts for elevated temperatures	For average thermal shock and moderate strength	II	Above 30,000 may be expected (10)		3.51—4.10 / 3.20 / 0.60 / 0.12 / (11)	Stoker and fire box parts, grate bars, process furnace parts, ingot molds, glass molds, caustic pots, metal melting pots.
		For higher strength (at temperature)	III	As high as 40,000 may be expected		3.20—3.80 / 2.90 / 0.60 / 0.12 / (11)	
						% T.C. / % Si / % Mn / % Ni / % Cr / % Co / % S / % P	
U. S. Navy	46-I-9	High alloy scale-resisting castings		25,000	130-180	Min. 2.60 / 1.25 / 0.80 / 12.0 / 2.00 / 5.0 / Max. 0.10 / Max. 0.20 Max. 3.00 / 2.20 / 1.30 / 15.0 / 3.50 / 7.0	For resistance to corrosion of acid caustic and salt solutions, including concentrate brines.
U. S. Military	MIL-G-858A (1)	High alloy for resistance to corrosion, scaling, warpage and growth	I	25,000	120-180	Min. 2.60 / 1.25 / 1.00 / 13.5 / 1.8 / 5.5 / 0.10 / 0.20 Max. 3.00 / 2.20 / 1.50 / 17.5 / 3.5 / 7.5	For use at elevated temperatures, galley range tops, to resist acid caustic and salt solution.
			II	25,000	120-180	Min. 2.60 / 1.25 / 0.80 / 18.0 / 1.75 / 0.50 / 0.10 / 0.20 Max. 3.00 / 2.20 / 1.30 / 22.0 / 3.50 / Max.	(For galley range tops, maximum shall be 0.20% S, 0.70% P.)

These general specifications for gray and nodular iron are those now used in selling castings. This summary was recently published by Gray Iron Founders' Society. Further specifications are given on the next page.

SUMMARY OF NODULAR IRON SPECIFICATIONS

Specifying Body (1)	Spec. No. (1)	Use	Class or Grade	Tensile Strength Min. psi	Yield Strength Min. psi	% Elongation in 2" Min.	Heat Treatment	Required Analysis				Typical Applications
A.S.T.M.	A 339-55	For high strength in as-cast condition	80-60-03	80,000 (2)	60,000 (2)	3.0%						Heavy duty machinery, gears, dies, rolls for wear and strength.
		For toughness and machinability	60-45-10	60,000 (2)	45,000 (2)	10%	Usually annealed					Pressure castings, valve and pump bodies, compressor heads, shock resisting parts.
A.S.T.M.	A 395-55T	Pressure containing parts for use at elevated temperature	60-45-15	60,000 (2)	45,000 (2)	15%	Shall be ferritized by annealing	Total Carbon 3.0% min.	Silicon 2.75% max.	Phosphorus 0.08% max.	Carb. Equiv. —	Valves and fittings for steam and chemical plant equipment. Steam dryers, etc.
U. S. Military	MIL-I-17166A (Ships)	Navy shipboard and other use requiring shock resistance	60-45-15	60,000 (2)	45,000 (2)	15%	Shall be ferritized by annealing. (14) to 190 max. BHN	3.0% min.	2.50% max.	0.08% max.	4.5% (15) max.	Motor frames, ends, engine blocks, heads, compressors, valves, clamps.
A.S.T.M.	A 396-55T	For maximum strength applications (obtained by heat treatment)	120-90-02 100-70-03	120,000 (2) 100,000 (2)	90,000 (2) 70,000 (2)	2.0% 3.0%	Shall be heat treated					Pinions, gears, cams, guides, track rollers etc.
U. S. Military	MIL-I-11466 (Ordnance)	Military equipment	Class 1	120,000 (2)	90,000 (2)	2.0%	Properties usually obtained by a quench and temper	Unless otherwise specified, one metallographic test shall be made for each lot. Graphite shall appear essentially in nodular form.				
			Class 2	100,000 (2)	73,000 (2)	4.0%						
			Class 3	85,000 (2)	60,000 (2)	6.0%						
			Class 4	80,000 (2)	60,000 (2)	3.0%	Generally as cast					
			Class 5	60,000 (2)	45,000 (2)	10%	Shall be ferritized by annealing					
			Class 6	60,000 (2)	40,000 (2)	18%						

GRAY IRON PRESSURE PIPE AND FITTINGS

SPECIFYING BODY	SPEC. NO.	TITLE	PRESSURE CLASS	REQUIRED CHEMISTRY % S Max.	REQUIRED CHEMISTRY % P Max.	TALBOT STRIP TEST MIN. MOD. OF RUPT. PSI	TALBOT STRIP TEST MAX. MOD. OF ELAS. SECANT	OTHER TESTS
ASA (4)	A21.2 - 53	Cast iron pit cast pipe for water and other liquids.	66-200	0.12	0.90	30,000	10,000,000	Hydrostatic, transverse test-bar, ring, bursting
ASA (4)	A21.5 - 53	Cast iron pit cast pipe for gas.	10-150	0.12	0.90	30,000	10,000,000	Hydrostatic, transverse test-bar, ring, bursting
ASA (4)	A21.6 - 53	Cast iron pipe centrifugally cast in metal mold for water and other liquids.	50-350	0.12	0.90	40,000	12,000,000	Hydrostatic, hardness, ring, bursting
ASA (4)	A21.7 - 53	Cast iron pipe centrifugally cast in metal molds for gas.	10-150	0.12	0.90	40,000	12,000,000	Hydrostatic, hardness, ring, bursting
ASA (4)	A21.8 - 53	Cast iron pipe centrifugally cast in sand-lined molds for water and other liquids.	50-350	0.12	0.90	40,000	10,000,000	Hydrostatic, transverse test-bar, ring, bursting
ASA (4)	A21.9 - 53	Cast iron pipe centrifugally cast in sand-lined molds for gas.	10-150	0.12	0.90	40,000	10,000,000	Hydrostatic, transverse test-bar, ring, bursting
ASA	A21.10 - 52	Short body cast iron fittings, 3" to 12" for 350 psi water pressure plus water hammer.	350	0.12	0.90			Transverse test-bar
ASA	A21.11 - 53	A mechanical joint for cast iron pressure pipe and fittings.						Tests are those used for pit cast or centrifugally cast products which ever is applicable
AWWA	C100-54T	Cast iron pressure fittings of bell and spigot type (standard dimensions given).	A, B, C, D					Transverse test-bar 1" x 2" x 24" Min. Load 2300#; Min. Defl. 0.50" As alternate use A. S. T. M. A-48 Class 25
Federal	WW-P-421a	Bell & Spigot Type I. - Caulked joint Water Type II. - Push-on joint Pipe Type III. - Mechanical joint	50-250 50-350 50-350	0.12 0.12 0.12	0.90 0.90 0.90	30, or 40,000 (16) 40,000 30, or 40,000 (16)	10, or 12,000,000 (16) 10, or 12,000,000 (16) 10, or 12,000,000 (16)	Design, weights, hardness, and hydrostatic tests specified

GRAY IRON SOIL PIPE, DRAINAGE, CULVERT PIPE, AND FITTINGS

SPECIFYING BODY	SPEC. NO.	TITLE	CLASS	REQUIRED CHEMISTRY % S Max.	REQUIRED CHEMISTRY % P Max.	TRANSVERSE PROPERTIES DIMENSIONS	TRANSVERSE PROPERTIES LOAD	TRANSVERSE PROPERTIES DEFL.	OTHER TESTS
ASA	A40. 1-35	Cast iron soil pipe and fittings		0.11	0.90	1.2" x 12"	1750#	0.09"	Hydrostatic 50 psi
ASTM	A74-42								Optional tensile strength 21,000 psi
ASA	G32. 1-42	Cast iron culvert pipe	Standard Heavy Extra Heavy	0.12 0.12 0.12	0.90 0.80 0.80				2,000 D (Pounds per foot where: 2,260 D (D = Nominal I. D. in feet 4,800 D (I to 3 edge bearing test of pipe section
ASTM	A142-38			0.10	0.90				
ASA	B16.12 - 42	Cast iron screwed drainage fittings		0.12	0.75				Tensile Test 21,000 psi
ASA	A40.5 - 43	Threaded cast iron pipe for drainage vent and waste service		0.11	0.90	1.2" x 12"	1000#	0.10"	Hydrostatic Test 50 psi
Federal	WW-P-266	Pipe, cast iron; drainage, vent, and waste, (threaded)		0.11	0.80	Pipe up to 3" diam. must meet transverse test on 30" span			Talbot strip test for pipe 4.0" and larger Mod. Rupt. 40,000 psi; Mod. Elas. 12,000,000 psi Hydrostatic Test 100 psi
Federal	WW-P-401	Pipe & fitting, soil, cast iron		0.11	0.90	1.2" x 12" (16)	1200#	0.20"	Hydrostatic Test 50 psi
Federal	WW-P-401A	Pipe & fittings, cast iron, drainage		0.12	0.78				Air Test 60 psi

GRAY IRON PIPE, FITTINGS, VALVES, FLANGES

SPECIFYING BODY	SPEC. NO.	TITLE	CLASS	REQUIRED CHEMISTRY % S Max.	REQUIRED CHEMISTRY % P Max.	TENSILE TEST MIN. PSI	OTHER TESTS
ASTM	A126-42	Gray iron castings for valves, flanges, and pipe fittings	A B C	0.12 0.12 0.12	0.75 0.75 0.75	21,000 31,000 41,000	22860 Min. Load 0.10" Min. Defl. (Transverse 33264 Min. Load 0.15" Min. Defl. (Test 48952 Min. Load 0.15" Min. Defl.) 1.2" x 12" bar
ASA	B16.4 - 49	Cast iron screwed fittings	125# 250#	0.12 0.12	0.75 0.75	21,000 31,000	
Federal	WW-P-508b	Pipe fittings, cast iron (screwed) 125 and 250 pound	125# 250#	0.12 0.12	0.75 0.75		Air Test of 60 Psi or Hydrostatic Test 250 psi 350 psi
Federal	WW-V-58	Valves, cast iron gate 125 and 250 pound screwed or flanged (for land use)	A B	0.12 0.12	0.75 0.75		Hydrostatic Test (twice steam pressure rating)
U. S. Navy	45-P-3f	Fittings pipe, iron (cast) threaded	A-125# B-250#	Not Specified	Not Specified		Air Test 60 psi

FOOTNOTES:

(1) Names and addresses are given on reverse side.

(2) The size of test bar shall be determined by the controlling section of the casting as follows:

Controlling section of casting	Test Bar	Bar Diameter Inches	Bar Length Inches
0.5" & under	A	0.875	15
0.5" to 1.0"	B	1.20	21
1.0" to 2.0"	C	2.00	27
Over 2.0"	C bar or larger size by agreement.		

(3) May be used by agreement in place of tensile strength.

(4) Properties in 1.2" diameter test bar unless otherwise specified.

(5) The final number of most specifications indicates the year of latest revision.

(6) The graphite shall be of type A, size 2 to 4 (see ASTM-A 247 Evaluation of Microstructure). The matrix shall be lamellar pearlite. Ferrite, if present, not to exceed 10%.

(7) The graphite shall be type A, sizes 3 to 5 (see ASTM-A-247 Evaluation of Microstructure). The matrix shall be of fine lamellar pearlite with free cementite, free ferrite, or both not to exceed 5%.

(8) Classes 30 through 50 are also covered but limited to use below 450° F.

(9) Carbon Content Equivalent is calculated as follows:
C.E. = %C + 0.3 (%Si + %P)

(10) Low strength iron is desired for thermal shock resistance. Where strength is essential, tensile strength may be specified.

(11) Depending upon whether cast in metal or sand-lined mold.

(12) Depending upon whether cast in metal or sand-lined mold.

(13) Tests in accordance with Federal specification QQ-I-652.

(14) Chromium, if required may be designated in range by type as:

Type	% Cr
A	0.00 to 0.40
B	0.41 to 0.80
C	0.81 to 0.50
D	0.90 to 1.20

(15) Test specimen shall be machined from a 1" Keel block or a Y block in ¼", 1", or 2" size by option of purchaser.

(16) As determined by "off-set method" at 0.2%.

(17) Applies to castings with sections 2" and over. SE = Y. G. + ½ SI.

(18) One metallographic test shall be made for each lot after annealing. The graphite shall be spheroidal; the matrix a min. of 98% ferrite with no primary carbides.

(19) Determined by the extension-under-load or by the 0.1% "off-set method."

(20) Test samples shall be machined from ¼", 1", or 2" Y blocks of specified dimensions, whichever approximates critical section of casting.

(*) These ASA specifications are sponsored by: The American Gas Association
The American Society for Testing Materials (Spon. A-377-54-T)
The American Water Works Association
The New England Water Works Association

Issued 6-55-55T
Revised 7-55-55M

Corp. in 1921 and operated it as the Geneva Fdy. Corp. in the capacity of president and general manager until the time of his death.

Clair Upthegrove, professor emeritus of metallurgical engineering, University of Michigan, passed away October 11. He joined the staff in 1916 and for many years was the senior metallurgist on the University's staff.

Joseph F. Ryan, assistant secretary and assistant treasurer of Allis-Chalmers Manufacturing Co. since 1933, died suddenly October 23. He was 61 years old.

Mr. Ryan started his career at Allis-Chalmers in the treasurer's division in 1915. He had a long record of associations with many community enterprises, was officer and director of the Navy League. He received a medal for patriotic service from the U.S. Treasury department for his part in war bond drives at Allis-Chalmers during World War II.

George J. Golden, president of Golden's Foundry and Machine Co., Columbus, Georgia, passed away October 18.

STATEMENT OF OWNERSHIP

Statement required by the Act of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946 (Title 39, United States Code, Section 233) showing the ownership, management, and circulation of MODERN CASTINGS, published monthly at Pontiac, Ill., for October 1, 1956. 1—The names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, American Foundrymen's Society, Golf & Wolf Roads, Des Plaines, Ill.; Editor, Jack H. Schaum, Golf & Wolf Roads, Des Plaines, Ill.; Managing Editor, Paul R. Foght, Golf & Wolf Roads, Des Plaines, Ill.; Business Manager, Curtis G. Fuller, Golf & Wolf Roads, Des Plaines, Ill. 2—The owner is: American Foundrymen's Society, Golf & Wolf Roads, Des Plaines, Ill., organized not for profit, without stock. Principal officers: President, Frank W. Shipley, Caterpillar Tractor Co., Peoria, Ill.; Vice-President, Harry W. Dietert, Harry W. Dietert Company, Detroit, Mich.; Secretary-Treasurer and General Manager, William W. Maloney, American Foundrymen's Society, Golf & Wolf Roads, Des Plaines, Ill. 3—The known bondholders, mortgages, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: none. 4—Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner. Curtis G. Fuller, Business Manager. Sworn to and subscribed before me this 20th day of September 1956 (Seal). E. R. May, notary public. (My commission expires March 14, 1960.)

afs chapter meetings

DECEMBER

3 . . Chicago . . Chicago Bar Assn., Chicago. Round Table Meeting. Gray Iron and Patterns Div.: W. T. Schmidt, Giddings & Lewis Machine Co., *"Casting Design and Lower Casting Cost;"* Malleable Iron Div.: R. Greenlee, Auto Specialties, *"Control to Eliminate Hot Tears;"* Steel Div.: Richard Ames, Illinois Carnegie Steel Co., *"Practical Testing & Selection of Refractories;"* Non-Ferrous & Maintenance Engineering Div.: W. O. Hanson, Allis-Chalmers Co., *"Noise, Vibration, Smoke."*

3 . . Central Indiana . . Athenaeum Turners, Indianapolis. Representatives from eight local foundries, *"Know Your Area Foundries."*

4 . . Rochester . . Seneca Hotel, Rochester, N.Y. Earl E. Woodliff, Foundry Sand Engr., *"Ways to Improve Your Foundry Sands."*

5 . . Toledo . . Heather Downs Country Club, Toledo, Ohio. L. W. Thayer, Cadillac Motor Car Div., General Motors Corp., *"Gray Iron Gating."*

6 . . Saginaw Valley . . Fischer's Hotel, Frankenmuth, Mich. Saginaw Valley Foundry Night. J. Stout, Buick Fdy.; R. Foster, Bay City Fdy.; H. McClelland, Eaton Fdy.; R. Klawuhn, Genesee Fdy.; F. Strieter, Dow-Midland.

6 . . Canton District . . American Legion Hall, Massillon, Ohio. Ladies Night.

7 . . Washington . . Seattle Town and Country Club, Seattle. Ladies Night.

7 . . Tri-State . . Tulsa, Okla. Christmas Party.

7 . . Northeastern Ohio . . Hotel Carter, Cleveland. Christmas Party.

8 . . Central Michigan . . Hart Hotel, Battle Creek, Mich. Christmas Party.

8 . . Twin City . . Leamington Hotel, Minneapolis. Christmas Party.

8 . . Central Ohio . . Lincoln Lodge, U. S. Rt. 40, near Alton, Ohio. Christmas Party.

8 . . Central Illinois . . American Legion Hall, Peoria, Ill. Christmas Party.

8 . . Mexico . . Restaurant Chapultepec, Mexico City, Mexico. Ladies Night.

10 . . Timberline . . Denver, Colo. Christmas Party.

10 . . Michiana . . Club Normandy, Mishawaka, Ind. G. W. Anselman, Whirl-Air-Flow Corp., *"Pneumatic Sand Handling."*

14 . . Oregon . . Amato's Supper Club,

Portland, Ore. Christmas Party.

14 . . Metropolitan . . Essex House, Newark, N.J. Christmas Party.

14 . . Wisconsin . . Schroeder Hotel, Milwaukee, Wis. Christmas Party.

14 . . Southern California . . Roger Young Auditorium, Los Angeles. Local Problem Casting Clinic and Christmas Party.

15 . . Corn Belt . . Rome Hotel, Omaha, Nebr. Christmas Party.

18 . . Connecticut . . Waverly Inn, Cheshire, Conn. Christmas Party with Connecticut Non-Ferrous Foundrymen's Assn.

21 . . Ontario . . Royal Connaught Hotel, Hamilton, Ontario. Panel Meeting. J. H. King, Archer-Daniels-Midland Co.; V. H. Furlong, Foundry Services (Canada) Ltd.; W. Moggeridge, Ford Motor Co., Ltd., *"New Developments in Coremaking."*

22 . . Cincinnati District . . Netherland-Hilton Hotel, Cincinnati. Christmas Party.

JANUARY

3 . . Saginaw Valley . . Fischer's Hotel, Frankenmuth, Mich. T. Barlow, Eastern Clay Products Corp., *"High Pressure Molding."*

4 . . Corn Belt . . Rome Hotel, Omaha, Nebr. O. C. Bueg, Arrow Pattern and Engrg. Co., *"Patterns."*

7 . . Chicago . . Chicago Bar Assn., Chicago. A. L. Boegehold, Research Staff, General Motors Corp., *"Materials in the Automobile of the Future."*

7 . . Central Illinois . . American Legion Hall, Peoria, Ill. C. E. Drury, Central Foundry Div., Saginaw Malleable Iron Plant, General Motors Corp., *"Gating to Control Pouring Rate and Its Effect on the Casting."*

7 . . Central Indiana . . Athenaeum Turners, Indianapolis. T. E. Barlow, International Minerals & Chemical Corp., *"Getting the Most Out of Green Sand."*

8 . . Twin City . . The Covered Wagon, Minneapolis. H. F. Randolph, Mexico Refractories Co., *"Foundry Refractories."*

9 . . Toledo . . Heather Downs Country Club, Toledo, Ohio. Tom Egan, Cooper-Bessemer Corp., *"Nodular Iron."*

11 . . Philadelphia . . Engineers' Club, Philadelphia. Casting symposium to be held in the afternoon before meeting. C. A. Sanders, American Colloid Co., *"Casting Finish. Precision and Tolerance."*

14 . . Central Ohio . . Seneca Hotel, Columbus, Ohio. Warner Bishop, Archer-Daniels-Midland Co., *"Common Sense in the Coreroom."*

14 . . Michiana . . Club Normandy, Mishawaka, Ind. J. A. Gitzen, Delta Oil Co., *"Core and Mold Sand Additives."*

16 . . Central Michigan . . Hart Hotel, Battle Creek, Mich. Youth Encouragement Night.

Classified Advertising

For Sale, Help Wanted, Personals, Engineering Service, etc., set solid . . 25c per word, 30 words ($7.50) minimum, prepaid.

Positions Wanted . . 10c per word, 30 words ($3.00) minimum, prepaid. Box number, care of **Modern Castings,** counts as 10 additional words.

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Help Wanted

FOUNDRY MANAGER

Man 35-45 thoroughly familiar with metallurgy and foundry practice for non-ferrous foundry producing valves and similar components. Send photo and complete work history including compensation requirements.

Lester B. Knight & Associates, Inc.
549 W. Randolph Street
Chicago 6, Illinois

FOUNDRY SUPERINTENDENT. To supervise Molding, Core and Cleaning Departments of one of the most progressive jobbing steel foundries in the Middle West, currently producing approximately 700 tons of steel castings per month. Must be familiar with heavy floor molding, roll-over machines, and squeezers. Prefer age bracket 30 to 45. Should be a college graduate. **Contact R. L. Gilmore, President, Superior Steel & Malleable Castings Co., Benton Harbor, Michigan.**

MAINTENANCE FOREMAN

Experienced in foundry maintenance. Modern mechanized plant. Good working conditions. Pensions. Health & life insurance. Paid holidays and vacations. Please state experience, age and expected salary. **Write to Box C194, MODERN CASTINGS, Golf and Wolf Roads, Des Plaines, Ill.**

FOUNDRY TECHNICIAN OR QUALITY CONTROL ENGINEERING ASSISTANT Mechanized gray iron foundry in Ohio producing quality engineering jobbing castings. Applicant should have some technical background, training or experience in one or more of the following fields—Metallurgy, Cupola Control, Sand Control, Gating and Risering. This position will offer many opportunities in increasing efficiency and control on all foundry operations including practical research, development and application on new foundry processes such as shell process and CO_2 process. Earnings will be dependent on qualifications and ability. **Box C160, MODERN CASTINGS, Golf and Wolf Roads, Des Plaines, Ill.**

FOUNDRY SUPERINTENDENT

Experienced man thoroughly familiar with metallurgy and foundry practice for non-ferrous foundry producing valves and similar componerts. Age 35-45. Send photo and complete work history including compensation requirements.

Lester B. Knight & Associates, Inc.
549 W. Randolph St.
Chicago 6, Illinois

FOUNDRY DEVELOPMENT ENGINEER. Well established research organization in the gray iron castings field has an opening for a development engineer interested in application of results of research to plant practice. Engineering training with at least 3 to 5 years plant experience highly desirable. Applicant should have an interest in the technical aspects of all phases of foundry practice with principal interests in sands, gating and risering. Some traveling involved. Must have ability to write concise reports and exercise initiative in carrying out a project. In replying give educational background, foundry experience and brief biographical sketch. **Address Box C192, MODERN CASTINGS, Golf and Wolf Roads, Des Plaines, Ill.**

WANTED—PATTERN SALES REPRESENTATIVE. Modern, well-equipped and established pattern shop with A-1 rating in middle west, 75 miles from Ohio-Indiana and Kentucky lines. Need patternmaker with some foundry experience along with a practical and technical experience in wood and metal patternmaking to expand our sales force. Should be able to quote pattern prices and handle customer relations in 150 mile area. Would consider training the right man. Salary open. Please submit resume and salary expected. All replies kept confidential. **Box C185, MODERN CASTINGS, Golf and Wolf Roads, Des Plaines, Ill.**

COMMISSION SALESMAN to sell gray iron castings for foundry located in Delaware Valley, Pa., **Box C195, MODERN CASTINGS, Golf and Wolf Roads, Des Plaines, Ill.**

FOUNDRY FOREMAN for Northern Ohio gray iron foundry employing 45 men on jobbing work. Opportunity for ambitious young man to supervise molding and coremaking. Send complete resume including age, weight, height, experience, salary desired, references, etc. **Box C193, MODERN CASTINGS, Golf and Wolf Roads, Des Plaines, Ill.**

MAINTENANCE ENGINEER for Northern Ohio iron and steel foundry employing 200 men. Jobbing foundry. Familiar with furnace, Morgan cranes, plant layout and production. Send complete resume including age, weight, height, experience, salary desired, references, etc. **Box C200, MODERN CASTINGS, Golf and Wolf Roads, Des Plaines, Ill.**

POSITIONS WANTED

PRODUCTION MANAGER. 10 years experience in mechanized, ferrous, non-ferrous alloy foundries, pouring up to 125 tons daily, desires position in Western states area. **Box C196, MODERN CASTINGS, Golf and Wolf Roads, Des Plaines, Ill.**

SUPERINTENDENT-FOREMAN. Fully qualified to take complete charge of all foundry operations. Broad experience with castings up to 10 tons. Superintendent of major jobbing foundry last four years. Resume sent on request. **Box C197, MODERN CASTINGS, Golf and Wolf Roads, Des Plaines, Ill.**

GRADUATE METALLURGICAL ENGINEER. Six years experience in large ferrous foundry. Desires enlargement of present supervisory position. Quality control or production management. Ferrous or non-ferrous. Age 33. Will re-locate. **Box C198, MODERN CASTINGS, Golf and Wolf Roads, Des Plaines, Ill.**

Man with thirty years foundry experience, last fourteen years in supervision and general management, would like position selling foundry materials or machinery to foundries or a supervisory position in production foundry. For more information write to **Box C199, MODERN CASTINGS, Golf and Wolf Roads, Des Plaines, Ill.**

FOR SALE

One completely Automatic Sludge Ejector Tank Model #26CV. LIKE NEW. Can be adapted to a washer type dust collecting system to permit re-circulation of water. Manufactured by the Whiting Corporation, Harvey, Ill. Has been used for experimental purposes only. **Di-Noc Chemical Arts, Inc., 1700 London Road, Cleveland 12, Ohio.**

One Taccone pressure molding machine for 12x18 flask with 50 sets steel flasks built for machine. **Arthur Harris & Co., 210 N. Aberdeen St., Chicago 7, Illinois.**

FURNACES FOR SALE
10 used Heat Treating Furnaces, and two 7-ton gantry cranes, good condition, priced to sell.
BAER STEEL PRODUCTS. INC.
Box 1428
Boise, Idaho

What AFS fineness does the sandman use?

Welding Rod Specifications

Specifications covering fillers used in welding various materials have been released by the American Welding Society and the American Society for Testing Materials.

One specification covers materials for welding gray iron, malleable iron and some alloy cast irons. Sixteen classifications of filler are covered for metal-arc carbon-arc and oxy-acetylene welding.

A second specification covers bare filler metals for the welding of nickel and high-nickel alloys. Thirteen classifications are listed for materials which may be applied by five welding processes.

Copies of the specifications may be obtained for 40 cents each from the American Welding Society, 33 W. 39th St., New York 18, N. Y.

advertisers and their agencies

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Their money ran out before they finished the new plant.

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